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The Patent System in the Global ICT Market

A Critical Analysis

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A Critical Analysis

ABSTRACT

The object of the present study is to assess today's patent system as it encroaches with broader areas such as technical innovation, economics and policy making, which have contributed to its very existence as much as the patent system have influenced them. In the case of Information and Communication Technology (ICT)—characterized by complexity, highly cumulative innovation processes and quick obsolescence—patent rights, which protect exclusive commercial exploits, are defective, as the overlapping of different patent protections may force companies to share revenues and cause blockages on manufacture. Although aimed at spurring overall progress, the patent system may indeed have a detrimental effect on innovation, manufacture and competitiveness in the ICT market. A bifurcated patent system could better respond to the needs of technology and society.

RESUM

L'objectiu del present estudi és avaluar el sistema de patents, des d'un punt de vista multidisciplinari, analitzant la innovació tecnològica, el context econòmic i la regulació legal, àrees que han contribuït al desenvolupament de l'actual sistema de patents, tant com aquest ha influït en elles. En el cas de les Tecnologies de la Informació i les Comunicacions (TIC)—caracteritzades per la seva complexitat, els processos de innovació altament acumulatius i la seva ràpida obsolescència—, els drets de patent, que protegeixen l'explotació comercial exclusiva, són imperfectes, donat que la superposició de les diferents proteccions conferides per les patents obliga a les companyies a distribuir-se els beneficis, permetent també possibles bloquejos de la producció tecnològica. Encara que estimular el progrés és l'objectiu del sistema de patents, aquest pot tenir un efecte perjudicial a la innovació, fabricació i competitivitat al mercat de les TIC. Un sistema de patents bifurcat podria respondre millor a les necessitats tecnològiques i socials.

RESUMEN

El objeto del presente estudio es evaluar el sistema de patentes, desde un punto de vista multidisciplinar, analizando la innovación tecnológica, el contexto económico y la regulación legal, áreas que han contribuido al desarrollo del actual sistema de patentes tanto como éste ha influido en aquéllas. En el caso de las Tecnologías de la Información y las Comunicaciones (TIC)—caracterizadas por su complejidad, los procesos de innovación altamente acumulativos y su rápida obsolescencia—, los derechos de patente, que protegen la explotación comercial exclusiva, son imperfectos, ya que la superposición de las diferentes protecciones conferidas por las patentes obliga a las compañías a racionar beneficios, pudiendo además causar bloqueos en la producción tecnológica. A pesar de que estimular el progreso es el objetivo del sistema de patentes, éste puede tener un efecto perjudicial en la innovación, fabricación y competitividad en el mercado de las TIC. Un sistema de patentes bifurcado podría responder mejor a las necesidades tecnológicas y sociales.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

CII	Computer Implemented Invention
EPC	European Patent Convention
EPO	European Patent Office
FTA	Free Trade Agreement
GATT	General Agreement on Tariffs and Trade
ICT	Information and Communication Technology
IP	Intellectual Property
IPR	Intellectual Property Right
JPO	Japan Patent Office
LDC	Less or Least Developed Country
MNC	Multinational Corporation
OS	Open Source
PCT	Patent Cooperation Treaty
PLEC	Patent Licensing and Enforcement Company
RTA	Regional Trade Agreement
SME	Small- or Medium-sized Enterprise
SPL	Spanish Patent Law: *Ley 11/1986, de 20 de marzo, de Patentes de Invención y Modelos de utilidad*
TRIPS	Trade-related aspects of Intellectual Property rights
USPTO	United States Patent and Trademark Office
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

FOREWORD

The purpose of the present study is to develop an objective assessment of the patent system. During its preliminary research and later development it became obvious that patent system literature consisted primarily of more or less biased sources: patent offices, governmental agencies, economic reviews, legal academics and representatives of certain industries. A considerable effort has been made to acquire an objective view of the fairness and efficiency of the patent system.

Not surprisingly, however, total detachment has not been possible. For that reason, further comments, insights and personal opinions have been included in the final text.

1 INTRODUCTION – PATENTS AND INNOVATION

> *[I]n the world's history, certain inventions and discoveries occurred, of peculiar value, on account of their great efficiency in facilitating all other inventions and discoveries. Of these were the arts of writing and of printing, the discovery of America, and the introduction of Patent laws.*
>
> —Abraham Lincoln (1809–1865)

Patents protect inventions. The express purpose of the patent system is to provide incentives for innovation, to add "the fuel of *interest* to the *fire* of genius."[1] By providing inventors with exclusive rights over their ideas, innovation is thereby stimulated. Patents secure the diffusion of this new technical knowledge, in exchange for temporary protection opposite to secrecy and free-rider behavior. By providing informational access to innovations, patents collaborate greatly to increase the social knowledge base and foster progress, by proverbially permitting others to "stand on the shoulders of giants."

With the increase of innovation and technological advancements, economic development is assured. Patent protection is, thus, a market incentive.[2] However, in recent years, patents have overextended their basic function of protection and have, in their own right, become an important source of market power, providing not only the means to defend against infringing products, but a basis for business valuation.[3] And, whether desirable or not, the patent system is becoming an increasingly important factor in global competitiveness.

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[1] This quote, and the one at the top of the page, are from Lincoln, Abraham, *Second Lecture on Discoveries and Inventions,* Jacksonville, Illinois: February 11, 1859, http://teachingamericanhistory.org/library/index.asp?document=2508 (accessed June 4, 2011).

[2] Baumol, William J., *Free-Market Innovation Machine: Analyzing the growth miracle of capitalism* (Princeton: Princeton University Press, 2002), 133.

[3] European Commission, *Green Paper on Innovation* (Brussels: European Commission, 1995), 14.

As the technological pace of change accelerates, potential inventions are increasing in complexity. Interrelations between technologies and rapid obsolescence provide further challenge to patent systems, decreasing the value of the protection granted in certain changing fields. The ICT market is particularly disrupted by certain impediments to innovation—which ironically, in some cases, are indirectly caused by the patent system.

All with all, the permanent goal of patent systems is to increase creativity and innovation, which are crucial to boosting technical advancement and economic growth.

1.1 SCOPE OF THE STUDY & ORGANIZATION

Intellectual capital will determine tomorrow's economy. The patent system, as guarantor of the protection of ideas, is indeed playing a critical role in the global technological market.

This project examines how the patent system *works* but, above all, is an analysis of how the patent system *affects*—and is affected by—the current global economic setting, the rapidly changing technological context of the ICT market, the legal and regulative framework, and social debate. The diverse issues considered relevant to the study became evident during the research process, and reflect and justify the multidisciplinary approach used.

The focus will therefore be on the main challenges facing the use of the patent system in the ICT market in the different areas abovementioned: legal uncertainty, the social principles of the patent system, the competitiveness of the ICT industry, and technologic innovation.

The goal of the present study is to contribute to the ongoing debate on the convenience and usefulness of the patent system in a high-complex technology framework, while suggesting out points of departure for regulatory bodies to implement further legal adaptation to the characteristics of the ICT field.

The report has been mainly structured to demonstrate the two conflicting aspects present in patent systems, individual rights and public interest. The legal aspects of the rights conferred by patents concern the first part. The second part has been structured following the separation between the various disciplines that concern the study.

Chapter 2 addresses the legal aspects governing patents and patent systems. There are more IP rights, but patents really have a privileged position underpinning the economy, and are

therefore studied. A typical granting process line is used to present the contents of the chapter: from the formal and subject requirements of a typical examination, to the outlining of the final right based in the patent claims. Specific legal issues are also addressed. Finally, the actual administrative process of patenting is presented.

Particular problematic issues concerning patent systems are presented in Chapter 3. The historical evolution of patent systems is traced, from the fifteenth century to later, more recent events. The 'balanced model' governing patent systems is depicted, with a special emphasis on noting the inherent and extrinsic challenges and flaws affecting the performance of the system. Some of these extrinsic effects are described in this same chapter, both macro- and micro-economic—from global markets to business strategy.

Chapter 4 gives a more precise insight on the current technological setting. It focuses on the specific case of ICTs and the market related to them. Particular issues hampering innovative processes in certain technologies are addressed, as well as particular cases of protection. Lastly, the consequences of the 'one-size-fits-all' approach in the technical field are analyzed.

Finally, Chapter 5 explores some future implications for the patent system as related to different disciplines, summarizes the study, and draws out the final conclusions.

2 LEGAL ASPECTS

2.1 INTELLECTUAL PROPERTY AND PATENTS

Property is the right to own, use and prevent others from using something. Intellectual Property (IP), in the same line of though, is the exclusive right authors retain over the knowledge they create. IP is a system to protect intellectual creation with commercial value, and to prevent others to use it without permission.

The immaterial nature makes IP a *strange* form of property to say the least. Knowledge and information is inherently non-exclusive (as it is not possible to deny the use of the good to the ones not owning it) and non-rival (the use of the good do not exclude or reduce its content), thus permitting the exploiting of others' creations. Ideas may be difficult to produce, but are cheap to copy. So, a system of protection for ideas was established. IP rights transform knowledge into an exclusive good, therefore authorizations are needed to use the information protected.

IP rights are divided into two categories: *industrial property*, which includes patents, utility models,[4] trademarks and industrial designs; and *copyright*, which includes literary and artistic works of any kind. Further information of the different types of IP is available at Annex L.

2.2 PATENTS, IN BRIEF

A patent is a type of IP consisting on a juridical title protecting an invention. The concept of patent will be exhaustively covered throughout the chapter, but for a better understanding of the following sections, patents will be briefly introduced.

[4] 'Utility models' protection is not recognized in all countries. Other names for the same protection are 'petty patents' and 'little patents.' Not to confuse with 'utility patents,' which is the actual name of patents in the US.

Rights conferred

Patents confer their owners the exclusive rights over their inventions: mainly, to prevent third parties not having the owner's consent from the acts of making, using, offering, selling, or importing the product protected—or products obtainable by the process protected. The inventions eligible for patent protection should comply with certain requirements: being novel, involves an inventive step, as well as being industrially applicable.

The right of exclusion is offered to the patent holder in return for disclosure of the particular innovation, which in turn assures the inventor to exploit the invention, ensure scientific disclosure and avoid secrecy.

Limitations

The 20-year period of protection begins when the patent application is filed at the patent office. However, the grant of the patent usually takes 2–4 years, but the patent owner may obtain retroactively compensation from the moment of filing of the patent application. Protection ends if the renewal fees are not paid, or the patent is revoked.

Patents are only valid in the country where the patent is applied. For protection in more than one country, patents must be filed in the other national patent offices defined by the applicant.

Patents ensure their owners exclusivity over commercial exploitation of the invention for 20 years in the territory where the protection is sought. Patent owners may also permit others to use or distribute their invention by means of licenses.

However, a patent does not authorize its holder to use or implement an invention, but merely to exclude others from using it. To actually produce a protected invention may require approval from national authorities in certain matters; and licensing of other patents, which could be needed to reduce to practice the invention.

Likewise, when patent owners will not—or cannot—exploit their inventions, national authorities may grant licenses if the invention is of a special public interest. The use for experimental purposes, related to the invention itself, is also not covered by the right of exclusion granted by patents.

Infringement

The scope of the protection and exclusion right of a patent is defined by the claims that accompanied the patent application. Claims formulate the exact aspects of the invention that are going to be protected—and only these aspects.

A patent is infringed if any activity not permitted by the patent holder is covered by the geographic, time and substantive protection of the patent. Restrictions already mentioned must be taken into account. When a patent is infringed by a third-party activity, the patent owner may ask for the desisting of the action of infringement, and compensating of damages.

2.3 REQUIREMENTS FOR PATENTABILITY

In Europe, the current legislation[5] establishes in its chapter II, articles 52.1 and 54–57, the conditions for an invention to be object of protection conferred by Patent Law. In spite of the short extension of these articles in the Patent Law as a whole, these precepts form the base of the protection system on patent rights, under the subsequent articles of the law.

Article 52.1 contains a general description of the inventions that can be subjected to exclusiveness and legal protection. Patentable matter is defined as follows: "patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application."

This definition implies the existence of three requirements for patentability:

a. novelty,

b. inventive step[6] and

c. industrial application.

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[5] 14th edition of the European Patent Convention (EPC).

[6] Non-obviousness in the English and American context. See also note **23**.

Patent legislation has traditionally collected some patentability prohibitions. Remarkably some inventions related to intellectual creation—such as software programs—and inventions related with life *per se*, even if fulfilling all requirements for patentability, are excluded or limited from it—by both the Spanish Patent Law and the European Patent Convention.

The basic principles for legal analysis of the patentability of an invention (novelty, inventiveness and industrial applicability) will be covered, as the knowledge of such mechanisms is essential for a correct interpretation of the patent right, and to determine the lawfulness (or lack of) of any alternative realization compared to the exclusiveness right inherent in a patent.

2.3.1 Novelty

The first requirement for an invention to be considered patentable is novelty. It is one of the basics of patent systems, and a capital element of any technological achievement expecting to be made exclusive: inventions should be *new*.

It is considered *new* something that is "produced, introduced, or discovered recently or now for the first time; not existing before."[7] As such, novelty is going to be determined by discovering if what is considered an invention existed before. Which seems a simple and inappropriate linguistic solution for the problem is, in fact, a definition very close to the legal meaning of the term.

For the sake of juridical certainty required for third parties, which is one of the most relevant contours of an exclusive right (on the competition field), the legislator has defined, *fictio iuris*, legal limitations used to determine the novelty (or lack of novelty) of an invention. As a result, the EPC establishes in its article 54.1 that "[a]n invention is considered to be new if it does not form part of the *state of the art*" [emphasis added].

At this point, it is recommendable to take the time to define this new resource.

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[7] As defined in the Oxford Dictionary in its first meaning.

The state of the art

The state of the art is the reference element with which the susceptible to patentability matter needs to be compared to evaluate its compliance for the requirements of novelty and inventiveness.

The law defines the state of the art relative to any existent work by the date of application that "[t]he state of the art shall be held to comprise everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the . . . patent application."[8]

There are then defined—not limitedly—two types of anteriority, which can be detrimental to validity of a patent application. So it seems, it should be necessary to consider novelty in light of everything made *available to the public* (in a written or oral way) previously to the application, and any *previous use*. There is no geographical limit respective to this point, which has not always been the rule.[9]

Written and oral descriptions

For the sake of practicability, it should be stated what commonly is considered part of "everything made available to the public." Typical written descriptions considered are: patents and utility models documentation, published by any patent office; publications of any type, especially those related to the technical field corresponding to the matter of the patent; but, in fact, any type of documentation registered on any oral or graphic media.

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[8] Article 54.2 EPC.

[9] In the same sense, Spanish Patent Law, in its article 6.2 ". . . in Spain or abroad . . . ." But for previous Patent Law from Spain, Britain, Germany (§2 Patentgesetz 1887), and other European states it was only considered as prior art the disclosures and uses made in the country. U.S. Patent Law, on the contrary, still maintains the condition of "prior use in the country," (35 USC, 102) provoking polemical decisions such as the granting of the Basmati Rice Patent. For a broader insight in this subject, see: Vandana Shiva, "The Basmati Battle And its Implications for Biopiracy and Trips," *Global Research*, September 10, 2001 http://www.globalresearch.ca/articles/SHI109A.html (accessed March 20, 2011).

Apparently, oral descriptions are also considered, even though there is a higher difficulty on proving their existence. Specifically, a public exposition made by the inventor or technology owner to others—without subjection to keeping the secret—is one of the typical cases.[10]

Any document with the slightest chance of accessibility will indeed be considered part of the state of the art. It is not necessary to demonstrate access to the information; it's enough to determine that there is evidence of the possibility of access by a third person, the *public*. The law does not contemplate if the information was more or less accessible: if any person can understand or transmit that information and has no obligation of keeping the secret of the technology, then it is considered available to the public.[11]

Prior use

Prior use of the invention could represent an obstacle for patentability if the public, by this means, had been granted access to the technology.[12] It is usually the inventor or technology owner who is responsible for such acts of disclosure, i.e., rushing the product to marketing or commercialization. The selling of only one unit of the product or distribution of catalogues or client leaflets is considered damaging to the granting of an applied patent—or to the validity of a given one.

Harmless disclosure

The European and Spanish body of law depicts legal exceptions for the use of detrimental disclosure elements as such, even though they were collected in the state of the art from what it has been established previously. The solicitor has to demonstrate the concurrence of

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[10] I.e., PhD thesis presentations, both oral and written, which are given to the jury.

[11] Cornish, William R., *Intellectual Property* (London: Sweet & Maxwell, 1997), 152.

[12] I.e., as considered in the EPO Boards of Appeals' cases T 84/83 (in which a wide-angle mirror fitted to a motor vehicle for demonstration purposes for six months; having the vehicle being it parked in the street or in motion in highways, is considered as public access to the invention) and T 245/88 (vaporizers installed in a non-restricted area before patent filing).

one of these disclosure circumstances occurred within the 6 months prior to the application for patentability:[13]

a. an evident abuse,

b. display of the invention in an official or officially recognized exhibition, or

c. tests made by the solicitor of the patent, without commercial exploit.

In determining whether a disclosure of the invention is "an evident abuse in relation to the applicant or his legal predecessor," the solicitor should be required to prove the act of abuse—i.e., corporative espionage—and cause-and-effect connection between the abuse and the final disclosure alleged against him. English legislation regulates, in a more precise way, that the exception should be applied if the information was obtained as a consequence of a non-disclosure agreement violation.[14]

As for the matter of exhibition of the invention in official expositions, the Spanish law is surely generous, compared to other European bodies of law and the EPC. For determining the range of harmless exhibitions, the Spanish Patent Law refers to the framework of the International Exhibition Convention—signed in Paris in 1928—, but nonetheless including others referred as "officially recognized exhibition[s]." This widening of immunity could lead into legal uncertainty and patentability disagreement between states, and contradiction with the EPC, as some authors have pointed out[15].

The last of the exceptions, working tests prior to the patent filing, is only gathered in the Spanish Law, and is considered for the effect of non-invasiveness of any working test made prior to the patent application. Anyway, these alleged working tests could never be an exploit of any way of the invention.

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[13] Article 7 SPL.

[14] Article 2.4, UK Patents Act, 1977.

[15] Gómez Segade, José Antonio, *La Ley de Patentes y de Modelos de Utilidad* (Madrid: Civitas, 1988), 64.

Although not included in the Spanish legislation, some states recognize the existence of another exception, called the *grace period,* in their patent systems.[16] This circumstance consists of an open period of six or twelve months before the proper filing of the patent, in which the disclosure of the invention (by the inventor or solicitor) is permitted. Thus, for example, an enterprise could offer its invention in a commercial campaign, without compromising the future novelty of the patent. Tests of the future acceptance of the product can be made in such a way. European states, it should be stressed, require absolute novelty for any patentable invention; as such, no disclosure or prior use should be made prior to the patent filing in any case.

Date of filing and prior patents' applications

The filing of the patent application is the temporal parameter, hereafter called the *priority date,*[17] which determines both the limits of the state of the art knowledge made public before that moment, and the start of the rights granted by the future patent. The consideration of the exact time of the filing, and no other options, such as the moment of discovering the invention, has been widely discussed.[18] Some disadvantages of this idea are: the difficulty of proving the establishment of that exact point of time; factual permission for later patentability of already commercially-proven inventions; and legal uncertainty to competitors.

Therefore, the state of the art is completed with any patent and utility models applications filed on a previous date to the filing of the patent. Additionally, any national patent or utility model applications filed previous to the priority date and which were published on or after that date, shall be considered as comprising the state of the art of any subsequent application. The inclusion of this type of documents is determined *fictio iuris* by the legislator

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[16] I.e. one year in the U.S. (35 USC 102.b)

[17] Article 89 EPC.

[18] Not to lose the focus, "the final purpose of the patent system is industrial progress. Thus, the moment of filing is ideal for establishing the state of the art, as it is the moment in which the inventor unequivocally expresses their wish to publish its contents to the benefits of society. If the society had by any other means access to that information, it would not be necessary to grant an exclusive right." Vidal-Quadras Trias de Bes, Miguel, *Estudio sobre los requisitos de patentabilidad, el alcance y la violación del derecho de patente* (Barcelona, J.M. Bosch Editor, 2005), 44.

(not published in that date, these documents should have been excluded by the article 54.2 EPC). Notwithstanding, for reasons affecting double-patenting of a certain invention, this exception helps maintaining legal certainty. A close reading of the article 54.2 indicates that further application of previous patent filings into the state of the art must be conditioned to their actual publication. I.e., a patent application withdrawn or not conceded, which has been kept in secret, should not be included in the state of the art.

Despite the exceptions exposed, the fact remains that in patent priority the principle of *first to file* is generally applied.[19]

Henceforth

Having presented the concept of the state of the art, determining novelty is not only a matter of recovering what was stated in the prior article 54.1 EPC—"[a]n invention shall be considered to be new if it does not form part of the state of the art."

This definition, which informs the interpreter of the patent what elements will determine if the invention is anticipated (and so its novelty), is not free of interpretative problems. More often than not, the solution of these problems will be spotted in the specific context for each assumption of patentability. Yet, to make things worse, these parameters are meant to serve agents or jurists in examining an eminently technical situation, which will not always be within their expertise. Therefore, as a general rule, it will be necessary for an expert in the field (or person skilled in the art) to assist them. The 'expert in the field' conception will be discussed in section **2.3.2**.

The variety of eventual documents to consider—taking into account the absolute principle of novelty stated in the law—makes it impossible to cover every potential anteriority existent in the world. From a practical point of view, no registry system—electronically managed included—is capable of registering the complete extension of available information. The

[19] U.S. patent system is currently based on the *first-to-invent* principle. There has been debate in this matter for ages, and is still not resolved at the time of writing—the *Patent Reform Act* of 2009 (S. 515/S. 610/H.R. 1260), still not voted by the U.S. Senate, argues for a change to a first-to-file system.

norm can only establish the external limit of the actual search activities of patent authorities.[20]

As such, novelty of an invention should be determined based upon an objective comparison with every priority cognizable by the public. This analysis must come from *individual* comparison between the invention and every component of the "state of the art," attending only to its content.[21] Determining whether the content of the invention was previously known will become the question established as the juridical finality of the novelty exam.[22]

To sum up, an invention lacks of novelty if any element or stage, including any implicit characteristic for an expert in the matter, is disclosed in a single element of the state of the art.

2.3.2 Inventive step[23]

The inventive step is the second requirement for determining patentability of an invention—as paradoxical as it may seem. Article 56 EPC includes a definition of the concept: "[a]n invention shall be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art." Three conditions for inventiveness may arise from its content:

a. "having regard to the state of the art,

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[20] Grønning-Nielsen, Leif, "Concept of Novelty," *International Review of Industrial Property and Copyright Law* 22 (1991): 929.

[21] EPO, *Guide for Applicants*, B.2 §32.

[22] It would not be licit to use a combination of documents to determine if an invention is new, as it will be the scope of the inventive step (or non-obviousness) valuation.

[23] In Europe (both national case law and EPO procedures), this requirement is called *inventive activity*, *inventive step* or *inventive highness* (*Erfindungshöhe* in the German patent system). In the British and U.S. systems, on the other hand, it is stated that the inventions should be *non-obvious*. As it would be further discussed in this chapter, each of these definitions are considered in the determination of this requirement by different possible patent examination. In the same direction, the TRIPS agreement, adopted by the WTO in 1994, which purpose is to harmonize IP application processes worldwide, states in its article 27 that, to the effects of requirements for patentability, "the terms 'inventive step' and 'capable of industrial application' may be deemed by a Member to be synonymous with the terms 'non-obvious' and 'useful' respectively."

b. it is not obvious

c. to a person skilled in the art."

Boundaries between novelty and inventiveness may be confusing at first sight. So to speak, appreciation of the latter is subsidiary to the existence of the first: lack of novelty will preclude absence of inventiveness—as the invention will obviously be covered in one component of the state of the art. Nonetheless, current legislation provides no doubt over the differences between the juridical nature of the two.

Hence, as it has been previously stated, for determining novelty, it only requires finding out if the invention was described as such in the previous state of the art. For determining inventiveness, on the other hand, it would be necessary to determine if the expert in the matter, from the same prior knowledge and their own, could obtain the same result, in an obvious way.

In addition to this, the documentation that constitutes the state of the art is different in case of determining novelty or inventive step. Article 56 EPC excludes the consideration of prior patent applications being presented before the one examined, but not having been published. Those documents were included previously in the state of the art,[24] to the effects of considering whether an invention was new—as seen in section **2.3.1**. The reason for this exclusion now is logical: although those applications were considered for avoiding duplication of patents, there is no justification in the use of these patent applications for analyzing inventiveness, as there has been no public access to them at the time of the filing.

Moreover, the requirement of inventiveness, as compared with determining novelty of an invention, has an element of uncertainty due to the subjectivity of this examination. The source of this subjectivity is the practice of this so-called *expert* or *person skilled in the art*. This concept of a juridical fictional character should be examined for a clearer view.

[24] Which, should it be remembered, were artificially included in the state of the art.

The person skilled in the art

The law leaves in the hands of this fictional character, created by the legislator, 'the person skilled in the art'—or 'expert in the field'—, the labor of interpreting whether if the invention results in an obvious way from the state of the art.[25] The first practical question that comes into the mind is who could be considered a person skilled in the art; that is to say, the knowledge and skills he or she needs to be considered as such. Current law does not depict these answers; precedential legal cases and academic opinion will be the principal sources of definition.

The expert should be 'skilled in the art' in matters related to the invention. This is an important affirmation, as even if the documentation considered to exam non-obviousness is defined as unlimited geographically and temporarily (backwards) by the law, the condition of "person skilled in the art" is intrinsically a limitation.

About the knowledge of this fictional character, applicable case law seems to consider the expert to be a *middle technician* in the relevant matter.[26] The expert, then, needs to be neither the ordinary worker nor the high-qualified professional; but, in my opinion, given today's complexity in some technology fields, something more than an experimented technician would be required to understand the invention and put it into practice—as stated in article 83 EPC. One way or another, they are supposed to read the relevant literature attentively, showing an unlimited absorption capacity, but no inventive skills.[27]

Finally, due to current interdisciplinarity in technical fields, determining the person 'skilled in the art'for evaluating an invention involving the expertise of different fields is not as

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[25] The *expert in the field* or *person skilled in the art* is cited in the EPC in Arts. 56, 69, 83, 100b, 138.1b, Rule 31, and in the protocol of interpretation of Art. 69. As for the Spanish Patent Law, the expert is present in Arts. 8, 25, 112.1b).

[26] "French, German and British experiences define the 'expert in the field' as a middle technician of the considered sector. He is the 'Durchschnittsfachmann' in German Law, the 'the man ordinary skilled in the art' of British Law, 'l'homme de métier moyen' . . . of French case of law." Mousseron, Jean Marc, *Traité des Brevets*, (Strasbourg: LITEC, 1984), 393.

[27] As stated in the EPO Court of Appeals' case T 39/93 (OJ 1997, 134), "whilst generally accepted definitions of the notional 'person skilled in the art' did not always use identical language to define the qualities of such a person, they had one thing in common, namely that none of them suggested he was possessed of any inventive capability. It was the presence of such capability in the inventor which set him apart from the notional skilled person."

simple as selecting a middle technician. In this case, the figure of the expert is formed by a group of skilled people in the relevant matters, configuring the legal concept of *expert in the field*. This is the actual configuration of expert teams working in complex fields, i.e. biotechnology, and such a figure is established in the EPO directives.[28] As such, the juridical fiction adapts to reality, and the character is supposed to have the knowledge required for determining patentability.

These guidelines represent basic conditions for an expert to satisfy its work; such an expert should be a good documentalist, consider the existing elements under the light of the applied invention and assess its degree of originality. Every single one of the conclusions attained should be based *only* in elements comprised in the state of the art.

Valuation of inventiveness

The experts in the field must meet certain specific characteristics. It is also essential to determine the extent of their functions as well as the procedural aspects of in their job.

Essentially, the expert must establish whether the object of the invention results from the state of the art in an evident way. As pointed out before, this exam is made after determining that the invention is not described in the state of the art and it is considered *new*. In this second stage, the expert focus will be to state if the solution was obvious, given the prior information to the filing date of the patent and his/her own knowledge. In other words, valuation of inventiveness entails determining if the expert would have arrived at the same conclusion as the inventor has.

To analyse the inventiveness (or non-obviousness) of the invention, the person skilled in the art will not use the documents or prior disclosures in an isolated way (as it has been done before when valuing novelty); on the contrary, he or she will combine this documentation to

[28] These appropriate circumstances happened in cases T 141/87 and T 99/89 of the EPO Court of Appeals.

determine if, as a whole,[29] it hosts sufficient information to sustain the obviousness of the invention, without resorting to the inventor's disclosure.

Problem and solution approach

European examiners almost always use this system in valuation of inventiveness, with the objective in mind of adopting homogenized criteria—and so assuring legal certainty.

The problem and solution approach consists, basically, of a three-step execution:[30]

1. determining the *closest* prior state of the art,
2. establishing the "objective technical problem" to be solved, and
3. considering whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person.

After carrying out these three actions, the examiner normally has the capacity to determine if the expert would have modified or adapted the previous elements of the state of the art to reach the same result of the invention. As stated in the EPO directives, the problem and solution approach is the recommended system of examination, but is not mandatory.[31]

Henceforth

As seen before, the requirement of inventiveness is not shown by the mere fact that the given solution never occurred to anybody. An invention is not obvious for an expert in the field unless it unmistakably results from the state of the art.

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[29] "Obviousness is judged by viewing the invention as a whole against the state of the art as a whole." Cornish, *Intellectual Property*, 169.

[30] EPO, *Guidelines for Examination in the European Patent Office* (Munich: EPO, 2010), C-IV, §11.5.

[31] "In principle . . . the problem and solution approach is to be used; however, if exceptionally some other method is adopted, the reasons for departing from this generally approved approach should be stated." Case Law of the Boards of Appeal 6th Edition, (EPO, 2010), I.D.2.

2.3.3 Industrial application

The third and last requirement for patentability is the capability of industrial application, "if it can be made or used in any kind of industry."[32] This includes agriculture and, potentially more interestingly, services. It seems rather obvious that almost all *technical* inventions satisfy this requirement.[33]

This last requirement for inventions to be patented, *industrial applicability,* is considered as such in the national European Patent Systems, and the EPO. . The latter, however, considers inventions as "technical solutions for a technical problem."[34]

In the US, the industrial application is not taken into account: to be patentable, inventions should be *useful*.[35] It is not compulsory for an invention, then, to have an industrial use, or provide a "technical contribution." This fact provides a legal base to admission of controversial patentable matter in the US, i.e. business methods.

2.3.4 Not patentable matter

Solicitors may apply for patent protection for any invention in any field of technology[36] provided they meet the requirements for patentability already presented—that is, novelty, inventive step, and industrial applicability.

The same law does not provide with a definition for 'invention,' but in any case provides, in the article 52.2 EPC, a non-exhaustive[37] list of what is not considered an invention. The items

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[32] Article 57 EPC.

[33] Except for inventions of typically not patentable matter; complicated instances such as sequences of genes, whose utility are not always obvious; and those violating Physical laws, such as machines functioning generating more energy than they need—also known as *perpetual motion machines*—, which are not capable of functioning whatsoever.

[34] Industrial applicability does not appear as an independent article. It is discussed instead in the EPO's *Guide for Applicants*, §B.27.

[35] About European and U.S. terminologies, and how the TRIPS harmonize them, see note **23**.

[36] Art. 52.1 EPC

[37] So-called 'non-exclusive' in EPO, *Guide for applicants,* B.I.

are either abstract or non-technical. As a rule, it can be said that inventions must be both concrete and have a technical character.[38]

The following are not considered inventions by the European law—and therefore not susceptible of protection:

a. Discoveries,[39] scientific theories[40] and mathematical methods;[41]

b. aesthetic creations;[42]

c. schemes, rules and methods for performing mental acts, playing games[43] or doing business,[44] and programs for computers;[45]

d. presentations of information.[46]

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[38] Which complies with the further requirements depicted in EPO, *Examination Guide*, C.IV.1.2.ii: "The invention must be of 'technical character' to the extent that it must relate to a technical field, must be concerned with a technical problem, and must have technical features . . . ."

[39] Mere discoveries of new properties from materials do not qualify as inventions according to article 52.1 EPC, as they are already existing matter not having a further technical effect. On the contrary, if the property is put to practical use, it constitutes an invention that may be patentable. Discovering of genes and microorganisms in nature with a technical effect are also patentable by the European patent law—see also section **4.6.1**.

[40] Scientific theories are essentially a more general form of discoveries.

[41] A mathematical method is an example of a perfectly abstract method.

[42] Aesthetic objects are creations having aspects essentially related to subjectivity and normally different from technical objects. Industrial designs and copyright may protect these creations. However, if these objects have any technical features they can be patentable, even if the aesthetic effect is not—i.e., a new type of binding for a book, which also has an aesthetic effect.

[43] All of them abstract methods.

[44] As such, business methods are intentionally excluded from patentability. However, if a technical process can be specified, it then may be patentable—see also section **4.6.3**.

[45] Computer programs are not patentable 'as such' (differentiation present in art. 52.3 EPC), but are not excluded automatically from patentability (EPO, *Applicants' Guide*). However, they are not excluded if causing a further technical effect occurring beyond the interaction of program (software) and computer (hardware). Computer programs patentability will be widely discussed in section **4.6.2**.

[46] Presentations of information are solely based on the content of the information, and are deemed not patentable—presentations *per se* or processes for presenting information (EPO, *Guide for applicants*). Other types of protection, such as copyright, already cover them.

In addition to the above-listed items, Patent Law may also explicitly exclude some scientific and technical fields, whose inventions are not patentable. This not qualifying matter is considered an exception to the rule, and is essentially determined by the patenting office to which the application is addressed. Thus, patented inventions for the USPTO may not be patentable at all at the EPO.

Article 53 EPC lists the matter excluded from patentability:

a. Methods of treatment of the human or animal body—surgery, therapy or diagnostic methods;[47]

b. plant or animal varieties, or biological processes for the production of both;[48]

c. and inventions deemed contrary to morality or 'public order.'[49]

The different national and regional offices have different standards regarding to what is considered an invention, and what matter is deemed not patentable.

2.3.5 Formal requirements

The requirements for the presentation of a patent application in any of the different national, regional or international offices are essentially analogous. That said, the documents needed for applying for patent protection are briefly presented.

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[47] This rule does not affect pharmaceutical products. These substances have a special treatment as regards to novelty requirements (art. 54.5 EPC): "even a known substance or composition may be patented for further medical or veterinary uses, provided that such use is novel and inventive."

[48] But not affecting to microbiological processes or products; in general, if a technical process is used to isolate biological material it is patentable. In the case of plant varieties obtained from crossing of selection, a separate form of protection is available in most contracting states and under EU law.

[49] The EPO, in particular, underlines the following: methods for the cloning of human beings, process for modifying the germ line genetic identity of human beings, use of human embryos for industrial or commercial purposes, and processes for genetically modifying animals that are likely to cause them suffering without any (substantial) medical benefit. Also, ethics of gene patents will be addressed in section **4.6.1**. Other inventions considered to be contrary to 'public order' are weapons contrary to war- and anti-terrorist- treaties, such as letter bombs.

Contents

In the case of patent filings at the EPO, article 78 EPC sets out the documents the application must contain:

a. "a request for the grant of a patent [European, in this case];

b. a description of the invention;

c. one or more claims;

d. any drawings referring to the description or the claims;

e. an abstract of the invention."

Further provisions are stated—in the case of the EPO—in the implementing regulations,[50] which further contour the characteristics of these elements.

Special attention will be drawn towards the disclosure make in the description and the claims, which are the key factor to the protection conferred by theresultant patent granted. Description, drawings and claims will be addressed in the following section.

2.4 PATENT CLAIMS & INFRACTIONS

2.4.1 Patent claims

The essential element which configures the economic framework of patents' rights is the tension between the patent holder interests—who benefits from the exclusive right because of a technical advancement provided to society—and those of the third-parties affected by the existence of this right and that are going to be deprived of space for technical growth.

The state,[51] as grantor and protector of patent rights, is responsible for merging the particular interests of individual patent holders and the competition, without losing sight of the general

[50] *Implementing Regulations to the Convention on the Grant of European Patents*, part of the EPC.

[51] Analogous to the national patent offices, this analysis is valid for supranational organizations.

principle of boosting innovation: disclosing the technical information of new inventions. At the same time, the national administration is also granting juridical certainty to what third-parties can do when accessing the information.

These patent holder's interests are articulated in the patent application and more specifically, in the claims, configuring the reach of the exclusivity right.

Claims as scope of patent rights

For a correct interpretation of what constitutes the object of a patent right and its juridical consequences—in terms of actual applicability in legal litigation—, the legal interpreter starts with a predetermined factice initial situation. This initial situation is determined by the reach of the object of the right, configured in the claims of the patent application. The analysis at this stage is taken strictly at the written facts, avoiding outside elements, thus using the application as it was submitted.

Patent claims are, therefore, the essential core for determining the protection granted to a patent holder. It is in the claims where the constitutive elements of an invention are detailed in the way the patent applicants want to guarantee their exclusivity.

Structure of claims

Claims are essentially made of two distinct parts: the *preamble*, which presents the object of the invention (the preamble does not configure the patent protection object as such; it has to be complemented by the technical disclosure of the invention), and the *technical elements*, which expose the inventive parts. The two parts are usually united by one of the typical grammatical elements, such as 'comprising,' 'said *device* comprising,' 'characterized in.' Indeed, the invention definition consists in the sum of the two parts, and each is equally important to configure the scope of the right.

Dependent and independent claims

Patent claims can be distinguished by comparing their level of sufficiency to define an inventive idea, essentially, whether its text does not refer to prior claims. The type of claim not containing any references to others is known as *independent claim*. Whereas claims that in their preamble refer to other claims and add additional limitations in the characterizing part

are referred to as dependent claims or 'particular embodiments,'[52] and they are normally used to cover realizations of the invention specifically useful.

Product, process and use claims

Practice has traditionally distinguished between different types of claims, depending on what was the nature of the object of protection. To simplify, one could consider these three: product, process and use claims.[53] The most important characteristics of every kind of claim will be discussed.

'Product claims' represent protection over a product, apparatus or substance, resulting from the invention, independently of the specific process used to produce it, and the further use of the given physical entity.[54] Thus, the patent holder has *a priori* a broader protection for its invention: by this means, an identical product in the territory of designation of the patent is sufficient base for patent infraction, and legal actions may be taken.

The second category of claims, 'process claims,' covers all every kind of method, process or manufacture for obtaining a given product or substance, or which requires some material product. This definition also includes the activities upon other processes, i.e. control processes.[55]

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[52] EPO Examination Guide C.III.3.4. Also, CHISUM proposes the separation between dependent claims, as integrating the limitations of the previous claim it makes reference to, and multiple dependent claims, which refers alternatively to two or more claims, and is considered to include all limitations in every referenced claim and itself, as defining elements of the claim. Chisum, Donald S., *et al.*, *Principles of Patent Law: Cases and Materials* (New York: Foundation Press, 1998), 87.

[53] It is also considered in the different national laws, with variations in the number of categories: TRIPS distinguish between 2 types, while the EPO essentially distinguish between claims over physical entities and activities, but refers to the third—use—, at the EPO Examination Guide C.III.3.1.

[54] As obvious as it may be at this point, product claims demand specifically the three patentability requirements—new, non-obvious and industrially applicable. As such, traditionally a product claim was not desired to patent already-known products with new effects added by the process used to manufacture them, i.e. pharmaceutical and biotechnological products. A *product-by-process* claim was the answer to these situations. Today, patent systems such as the EPO establish that this type of claims is only allowable "if the products as such fulfil the requirements for patentability" (Examination Guide C.III.4.12). So, independently of the phrasing 'obtainable' or 'obtained,' product-by-process claims confer basically absolute protection to the product; irrespective of the process described to make it.

[55] EPO Examination Guide C.III.3.1.

If the product obtained by a process protected by a process claim fulfills all requirements for patentability, then protecting the product itself should be recommended itself.[56] After all, legal enforcement of infringement of process patents is presumably harder to accomplish. Proving that a given product, which is being used or marketed, is obtained by a patented process is almost impossible.[57] For that reason, the European law resolves that its members must invert the burden of proof.[58] I.e., in case of existence of a product A allegedly equal to a product B resulting from a process protected, it is the creator of product A who should prove that its manufacture does not infringe the patent. Being so, further legal dispositions are made to prevent the misuse of *probatio diabolica* to provide patent owners a way of industrial espionage of competitors.

The last of the basic type of claims is the 'use claim.' Innovation could come in the form of new products or processes; but it is also possible that the new and inventive character comes from the unknown *use* of these already-known products or processes in a different technical field.[59] However, use patents are considered by the EPO essentially as process patents, in which the desired purpose is accomplished by the use of the given product or process.[60]

It is important to emphasize that, irrespectively of the type of claim an inventor refers in his or her patent application, some inventions would require claims in more than one category for full protection of the idea.

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[56] See note **54**.

[57] And certainly the means to achieve any prove of process infraction are probably illegal—it would require, at least, having access to the production methods of the infringer.

[58] Article 75 of Luxemburg Community Patent Convention.

[59] 35 USC, 101. An example of this type of claim could be patent US Patent 2600668: new use for the DDT—an already known product in 1952—as an insecticide.

[60] As considered in the EPO Guide C.III.4.16. Following the previous example: a use claim such as 'the use of DDT as an insecticide,' is equivalent to a process claim such as 'a process of killing insects using the substance DDT.'

Unity of Invention

As a general rule for patent offices, patent applications must relate to a sole invention—or, in some cases, it is permitted to relate a group of inventions forming a single general inventive concept.[61] This requirement is called 'unity of invention.'

Following this motivation, no more than one independent claim could be made in the same category—product, process or use. However, in the case of the EPO, following its particular ruling of unity of invention, multiple independent claiming is allowed, in the cases presented at Rule 43.2—that is, a plurality of interrelated products, different uses for the same product, or alternative solutions to a particular problem, when it is difficult to cover them all in one claim.[62] On the other hand, the USPTO has stricter requirements for unity of invention, and would rather ask applicants for different patent filings for the same European patent application.[63]

Broad claims' usual expressions

Wherever possible, patent applicants will like to introduce open expressions in the definition of its inventions. The interest behind this action is that, given an exclusive right over the patented object, they could maintain its exclusivity over a broader range of elements—legally, everything a 'person skilled in the art' could understand as comprised in the disclosure.[64]

It is not unusual in the writing of an application of a patent to keep the identification of the elements defined in a claim relatively open,[65] for example, providing a quite broad number of possibilities from the same elements included. In the American patent practice, these types

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[61] Article 82 EPC and Rule 44 EPC.

[62] This exception to the rule is mostly used in chemical patenting, when comparing products in their intermediate and final stages (where they have the same essential structural element, and the final product is closely inter-related with the intermediate or it is manufactured directly from the other).

[63] WIPO, *Summer School on Intellectual Property* (Geneva: WIPO – UNIGE, 2010), 22.

[64] Further discussion on the strategic filing of broad claims is discussed in section **3.5.1**.

[65] And open writing of claims could be as convenient as dangerous. It is contrary to the clarity and completeness that the law requires.

of expressions are called *means plus function elements*,[66] i.e., defining the union of two pieces from 'screwed' or 'glued,' which are quite limiting, to 'fastening means.' By using the expression 'fastening means' the applicant adds to the claim reach a wide range of other variants; these variants could cover many interpretations any third-party reading the patent disclosure—and some of them possibly never considered by the applicant. This type of generic formulae creates interpretation problems; for instance, when a given realisation of an element defined by a *means plus function* uses a mean not known at the date of filing.

In the same way there are other practices in claim writing used to specifically broaden the object of protection. More or less evident variants of an element could be included using a so-called *omnibus* expression. I.e. 'about' or 'approximately,' used with any numerical quantities or lengths, could mean that not only the indicated numbers are protected, but also its variations—included in what could be considered operational by a person skilled in the art. Or 'plurality,' rather than simply saying 'two' or 'three.'[67] Other *omnibus* expressions specifically refer to the multiple variations of the method of a claim by constructions such as 'substantially as described'. There are many more examples of these 'tricks' in the literature.[68]

The range covered by *omnibus* expressions can be subject of quite different interpretations in national courts, so its use varies from 'discouraged' to 'not accepted' by some patent offices, such as the EPO. In many cases, the final decision would be held in court if the patent was challenged. In my opinion, the practical inconsistency of the *omnibus* expressions affects negatively to the legal certainty of both applicants and third parties—any doubts on the scope of the patent may cause legal uncertainty.

Description and drawings

As previously discussed, patent claims should be written with clarity and precision, as stated by the law and for the patent holder best interest. The description itself provides an extended

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[66] DeMatteis, Bob, Gibbs, Andy, Neustel, Michael, *The Patent Writer: How to Write Successful Patent Applications* (New York: Square One Publishers, 2006), 107.

[67] DeMatteis, Bob, Gibbs, Andy, *Essentials of Patents* (New Jersey: John Wiley and Sons, 2003), 89.

[68] EPO Exam Guide C.III.4.6–7 provides other examples: 'start,' 'until there,' 'short,' 'long,' 'high,' 'strong,' 'soft.'

explicative definition of the invention, and is usually complemented by a certain number of drawings.

Description and drawings, as such, do not constitute any right object by themselves; however, the function of these elements is to help in the interpretation of the claims. Their use is necessary to understand the meaning of certain expressions that may be unclear but in no case a description should be used to increase the scope of the claims towards elements not previously protected.

The description provides information to the reader about the purpose of the invention and its technical field. The technological context is also given, covering both the approach of the existent technical problem and the solution proposed. To complete the description, one invention realization must be depicted, illustrated by examples and drawings.[69-70]

One of the basic requirements of every patent system is the disclosure of the invention in a way that is sufficiently clear and complete for an expert in the field to perform it—namely *sufficient disclosure*.[71] Insufficient disclosure prevents the granting of a right over an object. Non-sufficient disclosure is indeed one of the reasons of nullity of a patent.[72]

Therefore, sufficient disclosure is a requirement to the solicitor of a patent right, for three different reasons: one, writing clear and complete claims complemented by the description and drawings is a legal liability; two, it is in the best interest of the holder of the patent to sufficiently define the reach of its right for a good protection; three, clearly defining the object of protection in the disclosure is extremely important for the legal certainty of third parties.

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[69] Rule 42 EPC.

[70] It is not within the scope of this study to provide an exhaustive guide of the different elements composing the patent. For further information on drawings and their format one can refer to the EPO Guide for applicants. For the US special formats, Bryant, Joy L., *Protecting your ideas: The Inventor's Guide to Patents* (San Diego, Academic Press, 1999), 148

[71] Art. 83 EPC and EPO *Guide for applicants* C.II.67-68

[72] As is for example covered in the SPL, arts. 35 and 112.1.b.

2.4.2 Patent infraction

As said before patents are concession of rights, defined by the claims of the application. It is now time to discuss the legal reach of patent rights and the tools that can be used by patent holders to enforce unauthorized use of their inventions.

Essentially, patents are administrative acts[73] of constitution of a right to favor a private entity against third parties—via a beneficial position on a market. As such, this administrative act has two main effects over the rights of both the applicant and thirds. First, an enlarging effect over the juridical sphere of the beneficiary of the patent grant, as he or she has now the exclusivity of use of an invention. And secondly, it has a limiting effect of the juridical sphere of third parties, which are restricted on the use of the protected invention, which is prevented by the patent.

Patents provide their holders with the right to prevent any other person to use, manufacture or commercialize the protected inventions. Infractions of this right are enforced exclusively at national courts—as patent are territorial rights.

It is worth mentioning here that national courts work under the presumption of validity of the patent right in court. However, it is also true that rights conferred by patents are not guaranteed by the nation states: they have to be defended by the patent holder in case of an eventual infraction or legal challenge.

At court, in order to determine whether or not a competitor or third is infracting the exclusivity of the patent holder, a two-step process is required:

1. determining the reach of the right conferred by the patent,
2. studying the link between the objective elements related to the right[74] and the specific use the third party made, to determine if it is indeed an infringement of the patent.

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[73] In this case, patents are administrative acts from National Patent Offices.

[74] The objective elements include the state of the art, the date of filing, the concept of 'person skilled in the art' appropriate to the invention and, of course, the claims.

These steps require both legal and technical treatment: judges and technical experts will need to collaborate in cases of a certain complexity—the latter only to provide their knowledge, never at the point of decision-making. Of course, judges are the only ones making the final verdict.

Defining the reach of patent rights

The most common legal interpretation of patent rights in the US and Europe is the interpretation of a patent as any other legal text or law. This single interpretation guarantees a unity of criteria and legal certainty. This is the reason courts have opted for a law interpretation of the patent rights over contractual interpretation.

Criticism has been raised against the interpretation of patent rights under the scope of contract law, arguing that contracts bind the two parts and have no effect against third parties. In the case of a patent, the parts of the contract are outlined as the inventor or applicant and the Administration; the physical or juridical persons of the territory are entities out of the contract and, therefore with no legal compliance.

It is a point of view shared with several authors,[75] that the exclusion of third parties is not sufficient reason to deny application of contract law to interpretation of patent rights, and that its use has some benefits in itself. Patents, like contracts, are artificial constructions between two parts: the inventor and the society, represented by the Administration. The contractual relationship between creator and society provides a series of terms on exclusivity rights over a certain technology, which are limited by the content of the claims.

The benefits of the contract interpretation are essentially the easier possible interpretations to achieve over doubts and obscurities present in the reach of the claims' protection—thus providing legal certainty. At this point, a different strategy is used when solving these

[75] Such as VIDAL-QUADRAS. Besides, some court cases have considered the application of an interpretation of patents under contract law (i.e., Markman v Westview 517 U.S. 370, in the year 1996). At Vidal-Quadras, *Estudio sobre los requisitos de patentabilidad, el alcance y la violación del derecho de patente*, 152.

doubts in the interpretation of protection breadth present in the claims, analogous to contracts: the will of the parts.[76]

In contractual interpretation, in case of doubt, the subjective element is called upon: it usually attempts at understanding which was the will of the parts at the moment of signing the contract. Further answers are obtained by an analysis of these wills. However, in the case of patent *contracts*, one of the parts (society) did not participate in the negotiation.[77] In these cases, the principle of 'doubts damage the person who originated them'[78] applies; thus, any doubts may negatively affect the applicant, who should have pre-empted any obscurities in the contents of the claims.

Indeed, this interpretation is rather negative for the applicant, who has to make a greater effort writing the claims, but it provides legal certainty to third parties beyond the terms of the mere interpretation of patents as legal texts.

Evaluating the infringement

Once the protection breadth conferred by a patent is determined, there will be a defined scale to judge possible infringements of the patent. A patent is not infringed if the activity concerned is not covered by the geographic, time and substantive protection of the patent. If a patent is actually infringed, the patent holder may claim to make the infringer to desist from infringing the patent—an injunction—, and/or claim for damages[79] if criminal intent or negligence of the infringer is further established.

Infraction judgment has nothing to do with the subjective issues of the case: it is irrelevant whether the offender of the patent has reached the same result by inventing it independently to the patent owner did not know the existence of the patent. Likewise, and in a slightly

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[76] Arts. 1282, 1284 and 1285 Spanish Civil Code.

[77] The elements of the patent-contract are determined by the applicant's definition and their capacity to convince the examiner of the validity of the application.

[78] Art. 1288 Spanish Civil Code.

[79] To calculate the amount of these damages, patent holders have three options: the profit they have lost, the profit made by the infringer or the amount of money they would have received if they had granted a license. EPO, *Patent Information,* Brussels: EPO, 2008, §3 http://www.european-patent-office.org/wbt/pi-tour (accessed 20 February, 2011).

different fashion to other IP rights, such as industrial designs or copyrights, inspiration is not considered an infraction of the patent: the realization must contain all the elements protected in a particular claim.

When a specific third party realization of the invention includes at last all of the elements claimed, an infraction by *identity* has been committed, and its judgment is relatively evident.[80]

Another source of lack of legal certainty on the judgment of patent infringement is the special characteristics of a realization of the invention. When one or more of the elements protected is substituted by some technical equivalent, a new question arises: was the equivalent element sufficiently pre-empted in the patent claims? More likely than not, an individual analysis of the elements composing the patent will be required, following by an analysis of the evidence of the substitution, in order to determine if the infraction by *equivalency* exists.[81]

Enforcement and retaliation

The importance of patents in economic terms is uncontested and, as pointed out before, can really hamper the aspirations of competitors. It is hardly conceivable that a company accused of unauthorized use of a patent would not try to defend itself by any possible means. One of these acts of retaliation in these cases is achieved by attacking directly the source of right, that is, by alleging that the patent should not have been granted in the first case.

For similar reasons, valuable patents may likely be challenged after granting,[82] or when a third party is affected by them, i.e., if a company owns a patent which is dependent on other patents and wishes to revoke them.

These arguments of challenging validity of a patent or retaliation of infraction are logically opposed to the ones defending the position of the patent owner. Thus, the attacker or alleged

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[80] Vidal-Quadras, *Estudio sobre los requisitos de patentabilidad, el alcance y la violación del derecho de patente*, 239.

[81] *Ibid.*, 242–245.

[82] Or during proceedings at the EPO, USPTO and JPO pre-granting opposition, which are treated in a different way.

infringer will likely contest that the infringement use does not fall under the reach of the exclusivity right, and attack the validity of the patent. This second accusation motivates a second legal process, forcing a threatening situation on both sides.

Litigation on patent issues involves a substantial cost to all the parties involved,[83] both as monetary costs of the proceedings and commercial losses derived from periods of fabrication uncertainty or injunctions. These reasons usually force the different parties to reach an agreement, which could be a solution beneficial to both parties. Or not, after all, settlement is more likely to represent the economic portfolio strength of the two parties rather than their actual legal position. In these cases, settlements could usually entail a licensing or cross-licensing agreement.[84] Or, more drastically, the acquisition of one of the contestants by the other.

2.5 PATENT OWNERSHIP

Patents, as intellectual *property*, are considered personal property, and could indeed be object of any case of juridical deals—selling, licensing or loans. In the IPRs, including patents, there is different consideration between the personal right to be acknowledged as the creator and the commercial right to exploit economically the fruits of the technologyare different things.

All patent systems recognize the inventor as the original owner of the idea. The authors of an invention, likewise, must be named on the patent application. Thus, inventors are the owners of their inventions, although they may be obliged by contract to the cession of their idea—to their employers, usually.

Most patent offices do not take the distinction between author of the invention and applicant of a patent further than recognizing authorship of the first. The applicant, who could be a company, will finally be the owner of the patent rights. In the US, on the contrary, only

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[83] Typical costs of patent litigation are in the range of €40,000 (Europe) to $3–4million (US). In EPO, *Scenarios for the future* (Munich: EPO, 2007), 40.

[84] Licensing and cross-licensing are common figures in the ICT industry, and are further discussed in section **2.5.4**.

inventors have the right to apply for a patent, and thus formal ownership of the patent, while their employers are considered assignees.[85]

Ownership of patents is, indeed, a complicated matter. Complexity of new products patented and increasing of innovative processes in businesses intensify situations where collaborative innovation is needed, and where inventions are developed in the workplace. These situations present special cases of ownership of patent rights, which will be further discussed.

2.5.1 Joint ownership

In the case of inventions made collaboratively by several inventors, the ownership of the invention belongs to them all. Consequently, they could apply for a patent together, and become joint owners of the granted patent. Personal rights—authorship—are not transferable and, generally, non-joint invertorship can be extended to a third person that has not contributed to the invention.

As a general rule, joint inventors need to designate a principal delegate for the realisation of typical bureaucratic actions at patent offices. Typically, any member of the joint patent could carry out beneficial or non-invasive actions towards the patent right. On the other hand, mutual agreement between all patent joint owners will be needed to execute other actions that are considered detrimental for the patent right.[86] Patent office regulations and national joint-assets legislation of the different countries could provide further adjustments.

2.5.2 Individual inventorship and 'interference procedures'

On the other hand, inventions carried out by different people in an individual fashion, could only be protected by one—and only one—of these inventors.

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[85] Junghans, Class, Levy, Adam, *Intellectual Property Management: A Guide for Scientists, Engineers, Financiers, and Managers* (Weinheim: WILEY, 2006), 16.

[86] I.e., in Spain, art. 72 SPL and Common Law on Community Property regulate these interactions. These are typical actions that could be done by one of the joint applicants: selling of their part of the patent right (giving the opportunity to the other applicant to buy it first), exploit of the protected invention, paying patent renewal fees, and suing infringers of the patent. Conversely, these are actions that will need the agreement of all joint-applicants to be executed: withdrawal of an application, and concession of a license to any third-party.

Both authorship and ownership of patents is differently solved in the US and the rest of the world. As a general rule, patent offices grant a patent right to an invention to the person who applied first it, that is, the patent application with a lesser 'priority date'—so called first-to-apply systems.

In exchange, in the US patents are granted to the person who could prove to have had the idea before, and are therefore first-to-invent systems. It may be noted that, besides US inventors, this fact is particularly important for any other inventor or company interested in protection in the US. Even being the first person to apply for a patent would not prevent you from having to prove that you are the person who actually invented it *first*—which would certainly require research notes, sketches and other recorded proof.

Disputed ownership in the US is contested by 'interference procedures,' which seek the determining of the actual date of invention.[87]

2.5.3 Employee inventions

The pace of advancement and complexity of technology[88] provide a framework for innovation hard to achieve by individual inventors without proper equipment and research support. Due to these working constrictions, most economically-significant technological inventions are created by R&D workers in well established companies.

The fact that inventions are made by employees of a company provides further conflict about who is the owner of an invention. Principles ruling such ownership should be found in the applicable law—in this case, industrial and IP legislation. According to the principle of inventorship, creations belong to their authors. However, industrial law states that labor belongs to the employer.[89] In a sort of compromise, the different national laws provide that

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[87] In US legal practice (35 USC 135), the inventive act consists of two phases: the 'mental' idea of the operative invention and the actual 'reduction' to practice—the realisation into a physical form. The actual 'inventor' is always considered to be the proven first person to conceive the invention, but only if he or she can also demonstrate diligence towards the goal to reduce the invention to practice.

[88] Effects further discussed in section **4.1**.

[89] Junghans, Levy, *Intellectual Property Management,* 74.

worker-inventors should be granted authorship—'moral right'—and ownership of the invention, but the worker must normally transfer their rights to the employer.

In some susceptible working areas for inventing, such as research departments, transferring of ownership of inventions is generally regulated by contract. In most other cases of employer inventions, an economic compensation is negotiated.

In most jurisdictions, it is customary to differentiate differentiated between 'tied' and 'free'[90] inventions. Tied inventions are related to work, made during the term of the employment—even not during working hours—, and which are implicitly or explicitly included in the duties of the workers. Ownership of this type of inventions are granted to employers, who are provided a lapse of time to apply for a patent and make use of their rights; after that time, the rights of the invention are normally offered to the employee. Free inventions, on the other side, are those the worker creates outside of his or her working duties, with no relation to the industry of the employer or not applying knowledge from the company. This second type are normally own by the worker, who can keep all the inherent rights.

It should be stated that there are quite significant differences in managing employee creation, depending on the country where the contractual relationship is established.[91]

2.5.4 Transmission of rights

As seen previously, personal rights of a patent—authorship—are not transferable; only rights with patrimonial nature are susceptible of being disposed to any third-party. In general, patent rights are transferrable by a licence, and can be sold, and handed over as goods or contribution to an enterprise.[92] In the US, as well as in some European countries, patent could be also used as loan assets.

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[90] Using German legal practice nomenclature.

[91] In Germany, there are predefined royalties and the possibility to employees to patent in the countries not covered by employers' patents. In Spain, on the contrary, even inventions made by the employee one year after contract extinction could be deemed as belonging to the prior employer.

[92] Individual claims of a patent are not susceptible to be transferred.

Licensing

A patent right entails to its owners exclusivity over the use of the product or process protected, and allow them to profit of the monopolistic situation—provided they could bring their idea to the market. The level of investment required to market the invention and obtain a profit from it could be high, and probably would require further assets to commercialize the product globally. Financially, it is easily out of reach of individual inventors and SMEs. Licenses are mechanisms that provide the owner of a patent the *purest* form of income from his or her right: monetary income without having to sell the patent.

The basic structure of a license agreement is as follows: the owner of the patent—the *licensor*—allows a third party—the *licensee*—to use his or her patent rights, normally for economic revenue. Formal rights are kept by the licensor, but the licensee is authorized to manufacture and market the invention; thus the licensee is excluded of the general prohibition of exploit.

In most license agreements, at least a part of the revenues paid to the licensor are based on the licensee's sales of the products covered by the patent. Such figure is called 'royalties,' and is referred to the number of units sold or the revenues from the selling—net sales—made by the licensee.

Licensing agreements may be differently made. With regard to the scope of the license, it can be limited territorially, permitting the market of the invention in other countries, where the company lacks the assets to enter.[93] Limits to the kind of utilization to a precise range of actions are also possible—licenses for research, diagnostics, manufacture of certain products, or only market. Finally, licenses can be granted 'exclusively,' that is, the licensor may not further grant any other license referring to the same scope to any other third-party.

[93] 'Worldwide' licenses would have the effect to use the rights anywhere in the world. However, a licensee would rarely pay royalties for products sold in countries where there are no implemented methods of IP.

The importance of licensing and cross-licensing[94] agreements is precisely the flexibility degree that can be achieved, and are extremely helpful at settling situations of intense litigation and technology-dense frameworks.[95]

However, there exists a possible anti-competitive effect of certain license agreements, which could cause that some clauses be enforceable under competition law. Most countries have laws prohibiting agreements negatively affecting on competition, while considering the agreement void or subject to a certain fine.[96]

Exhaustion of rights

After marketing products protected by a patent, the exclusivity of right of the patent owner cannot impede future exploit of these products by the people who have acquired them. This figure is known by the name of exhaustion of rights, and is applicable in the country where its owner or an authorized third sold the product. The principle applied is that a product is marketable only if the purchaser may resell it.[97]

This is particularly interesting in the case of licensing in the territory of the European Union, as exhaustion applies in all member states once the product is sold in one of them.[98]

Expropriation and compulsory licensing

There are different situations where patent owners could be deprived of their ownership of their rights over an invention, or their exclusive rights diminished to permit exploitation of their inventions without their consent.

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[94] Situation when two companies license parts of their patent portfolio to the other, so each of them becomes licensor and licensee at the same time; thus permitting access to a range of technology.

[95] As presented in section **4.2**.

[96] Near-monopolistic situations are parts of the IP game, however, specific restrictions are considered in the European Union under article 81 of the ECT (European Community Treaty) and the TTBER (Technology Transfer Block Exemption Regulation).

[97] Art. 54.2 SPL

[98] I.e., in the case of licenses, the owner does not have any means to prevent the resell in Germany of its products sold by its licensee in Portugal. So, it is not possible to license more than one territorial license in the European Union.

Patent applications or already-granted patents could be expropriated by means of a public utility or social interest.[99] The owner has the right of a full compensation, in any case. It could be the case of invention in which the country is interested in entering public domain.[100]

In some countries, owners of a granted patent have a determined lapse of time when they— or an authorized licensee—must exploit their invention to provide sufficient production to satisfy demand of the territory where the patent has been granted.[101] In case of insufficient manufacture and patent dependence,[102] the state would grant compulsory licenses to thirds requiring it, against the will of the patent owner if necessary. These compulsory licenses would be non-exclusive, and would provide economic revenue to the patent owner based on the importance, on economic terms, of the invention.

2.6 ADMINISTRATIVE PATENT PROCESS

Process for patent concession, its formal and matter requirements and, occasionally, the reach of the rights granted, vary within the different national patent systems and international treaties— some examples were already presented in this chapter. However, the fundamental process for obtaining patent protection remains essentially similar in any given national, regional or international system.

2.6.1 Fundamental procedure

These are the three essential phases of application and granting of a patent in any given patent office:

1. *Application*. The agent requiring protection for an invention may present a patent application to one of its designated patent offices. The date of the filing of the

[99] I.e., art. 73 SPL.

[100] I.e., the French government bought the Daguerreotype patent in 1839 to provide it to the public domain.

[101] Spain is one of such countries, with compliance to produce between 4 years after applying, or 3 years after granting. Art.83 SPL.

[102] That is, patent A owners requiring another previous patent B to actually produce their dependent patent A, shall be given a reasonable license on the scope of patent B, if the invention establishes a technological advancement or is of economic significance. Art. 31.l TRIPS.

application at the patent office is called the 'priority date,' and will be considered the same throughout the process and ulterior filings to other offices. The application should disclose the invention with such detail that a person skilled in the art could understand it entirely and make use of it. More interestingly, claims—aspects of the invention—are the part of the application where the solicitor declares explicitly the exclusivity rights he or she demands. Various fees may apply, and formal requirements must be fulfilled.[103]

2. *Examination*. The patent office appoints an examiner, who is a person skilled in the matter of the invention claimed, to deal with the application. The examiner verifies the novelty of the invention, by means of determining that the invention is not part of the relevant state of the art—all disclosure in scientific and technical literature, published prior to the date of application. Afterwards, the examiner proceeds to determine if the invention implies inventive activity, or is non-obvious, in relation to the state of the art previously considered.[104] The applicant may present an oral or written opinion about these conclusions, and modify the reach of the application claims, if necessary. In some offices, none of this examination process happens, being only necessary to register to be granted a patent. Patent applications are usually made public, together with the report of the state of the art, 18 months after the priority date, with some exceptions.[105]

3. *Granting*. The patent is not granted if a reason is found to reject it—the invention is not patentable matter or it lacks novelty, inventive activity or industrial application. Otherwise, granted patents are published and enter into force for a maximum period of twenty years from priority date, provided the holder maintains the yearly fees. Patents could be contested by third-parties, based on defects of patentability of the invention; such opposition could be presented either before the same patent office—such as the

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[103] Further information about formal requirements is given in section **2.3.5**. Claims and rights were discussed in section **2.4.1**.

[104] Again, further discussion concerning subjective examination of inventions—novelty and inventiveness—can be found in section **2.3**.

[105] In the US, patent applications fulfilling certain requirements could be kept in secret until their granting. See section **2.6.3**.

EPO, or the appeal courts of the USPTO and JPO—or in the national courts, depending on the patent office.

2.6.2 Alternative pathways

Protection for an invention by a patent requires fulfillment of a certain administrative process. For obtaining a patent for an invention, the solicitor files an application at a patent office, where the patentability requirements will be verified for protection to be granted. Alternative ways exist for inventors to obtain these patent rights and, depending on the level of commitment, strategy and international scope, one or the others pathways of application should be selected. The different available application pathways are national, regional and international, which will be briefly presented.

National way. When deciding to protect an invention, the first stop is usually the presentation of an application into a national patent office,[106] whatever may be the international strategy—that is, if the applicant is willing to obtain protection in only that territory, or in more. The date when the first patent application for any given invention is presented in a patent office, anywhere in the world, is known as 'priority date.' In the national offices, the period between the presentation of an application and granting or denying of a patent right varies from one national office to another—from two to eight years.

Regional way. Regional offices are an additional option for patent procedures if the solicitor is looking for protection in any number of countries of one of the regions with this type of system.[107] It is a centralized way of applying for protection, which permits to reduce the processes in the national offices—and more interestingly, the fees one may incur.

International way – PCT. The Paris Convention of 1883 was the first step towards a worldwide homogenization of the patenting processes. In 2011, 143 countries have ratified the treaty, thus permitting to any solicitor willing to apply for a patent in more than one of these

[106] Usually the national office of the country of the solicitor, but there is no restriction in this respect.

[107] These are the regional patent offices existing at the time of writing: African Intellectual Property Organization (OAPI), African Regional Intellectual Property Organization (ARIPO), Benelux Office for Intellectual Property (BOIP), Eurasian Patent Organization (EAPO), European Patent Organization (EPO), Interstate Council on the Protection of Industrial Property (ICPIP), and the Patent Office of the Cooperation Council for the Arab States of the Gulf (GCCPO).

countries to do so in the 12 months from the priority date. By doing so, protection would be applied from the date of the first filing in every country affected. Alternatively, and similarly to the regional process, applicants could use the process established in the PCT, which has some potential benefits: unified process, reduction compared to national fees and elapsed time for market study. The PCT process will be presented in more detail in this chapter.

It is important to note that any regional or international patent applications must ultimately have a national status,[108] as they have to be validated by the national offices of every territory designed. As such, unique national characteristics—both the concession process and the post-granting activity—must be taken into account when looking for protection in other countries.

2.6.3 National and regional process

Over the years, different international treaties have been used to harmonize the assorted national patent application processes, and to provide a more efficient protection for inventors searching for protection in multiple countries. In this sense, the Paris Convention and the PCT have had a fundamental role in harmonizing the rules of these processes.

In the 90s, the signing of the TRIPS, under the WTO, established minimum criteria for IP regulation in the WTO member states. These changes are further discussed in section **3.4.2**, but it is worth noting now that TRIPS introduced the minimum duration of a patent of 20 years[109] and the cover of all technology fields by patents[110]—including pharmacological products.

In spite of the trend towards convergence, each patent office has its own regulations, essentially at the level of patent subject examination and processes. These differences are the target of further harmonization in the case of the principal world patent offices—namely,

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[108] There is no such thing as an 'international patent.' On the other hand, there is a 'European patent,' but in any case it has to be accepted by national offices to be fully operational.

[109] Art. 33 TRIPS.

[110] Art. 27.1 TRIPS

'the Trilateral Cooperation:' USPTO, JPO and EPO.[111] The more detailed processes are to be found in the EPO, being a regional patent office.

EPO procedure

For practical reasons, the process of granting of patents at the EPO will be presented and discussed. This patent system is sufficiently relevant, closer to national systems, and harmonized with the European national patent offices, to be worth consideration.

The European Patents' Granting Convention, mostly known as European Patent Convention (EPC), was signed in 1973 and entered into force in 1977. As a result of the EPC, the EPO was set up for granting patents based on a centralized examination process, and to create one uniform body of substantive patent law. By means of presenting a sole application for a European Patent in one of the three official languages, an inventor can obtain patent rights in every contracting state of the EPC, thereby reducing costs.

The patents granted by the EPO, 'European patents,' have the same rights, and are subjected to the same conditions as the ones granted by national offices of the EPC's member states. European patents, after granting, are therefore considered a 'bundle' of national patents, which nonetheless need to be validated by the national offices of the designated states.[112]

Applications for a European Patent[113] may be filed directly at the EPO in Munich[114]—or its branches at The Hague or Berlin—or at any of the national offices of the 32 member states.[115] The language of filing could be any of the official languages of the contracting states, but a

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[111] Forming the 'Trilateral Cooperation' since 1983. Recently, the Korean Patent Office (KPO) and Chinese Patent Office (SIPO) joined the group.

[112] An actual 'European patent,' which would be valid in all EU states from the moment of granting at the EPO, does not exist as such. Given the difficulties of achieving an agreement on the issue—the EPO is still not an UE institution—and the importance of the actual 'European Patent' (a "key objective," in words of the European Commission), other proposals are trying to reduce these differences. In this sense there is the London Agreement, on costs of translations and languages, and the EPLA, on litigation costs. Cite from the European Commission, "Enhancing the patent system in Europe," *Communication from the Commission to the European Parliament and the Council*, (Brussels: 2007), COM(2007) 165 final, 4.

[113] An example of the typical costs of a European Patent are presented in Annex F.

[114] EPO, *Guide for applicants*, C.III.104

[115] See Annex E.

translation in one of the official languages of the EPO—English, German and French—must be made available within 2 months of the filing of the application.[116] The language in which this translation is provided will be the language of all proceedings. The date of filing of the application is considered the *priority date* for all purposes.

A European patent application consists of "a request for the grant of a European patent, a description and drawings of the invention, one or more claims, and an abstract."[117] Alternatively, one inventor may reclaim the priority right for a previously patent application in a state party of the Paris Convention, or from a Euro-PCT application.[118] One way or another, the correct configuration and other formal requirements are checked at filing.[119] Thereafter, the preparation of the search report is done. The search report is drawn up "on the basis of the claims, with due regard on the description and any drawings,"[120] and contains all documents available to the EPO at the time of preparing the report,[121] which helps to determine whether the invention related is new and involves an inventive step.[122] Based on the search report, a preliminary opinion on patentability is provided.[123] This first stage of the procedure is completed by the publication of the application and the search report, but not the preliminary opinion, 18 months from the date of filing or priority—whichever is the earliest—; or before, if requested by the applicant. The publication opens a period of time in which the applicant indicates to which EPC member states the protection is sought.

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[116] EPO, *Guide for applicants*, C.I.42

[117] Art. 78 EPC. The contents of a typical patent application were further discussed in section **2.3.5**.

[118] A Euro-PCT application is a typical PCT application—an international patent application presented in section **2.6.4**—whose national step is made by a European Patent.

[119] These formal requirements are further developed at EPO Rules 56–60 and in the EPO *Guide for examination* A-II.5, A-III, A-V.2, C-VI.3.1, E-I, E-II. It is not in the scope of this work to provide such detail, but it worth noting that the applicant is usually required to amend within a period of two months any errors or omissions existing in the files presented.

[120] Art. 92 EPC

[121] It will be established afterwards whether the date of the documents is in conflict with the priority date, with more attention to prior patent applications.

[122] Incomplete searches based on lack of meaningful matter or unity are considered in Rules 63 and 64, respectively.

[123] Rule 62 EPC

The second stage starts with the substantive examination of the patentability of the invention, which is performed by a three-member technically qualified division,[124] by request of the applicant within 6 months from publication of the application. If the application is deemed allowable, a grant will be proposed; if not, an exchange of communications between the examining division and the applicant will occur and, if necessary, amendments to the claims, description or drawings will be made.[125] This procedure is, therefore, finished by a proposal to grant or refusal of the patent application. If granted, the applicant will be required to pay the fees and perform any remaining formalities.[126] The specifications of the European patents granted are finally published in the European Patent Bulletin.

Competitors or opponents to the applicant may make comments during the latter of these proceedings, between the publishing of the application and the final grant;[127] as the EPC system provides this possibility. Any third parties may also oppose the grant of a European patent within 9 months from the final publication of the granted patent, and they have the right to be heard presenting the basis for their opposition before the EPO. Any party negatively affected by a decision in almost any procedure of the patent process, may present an appeal, which is to be heard by the Board of Appeal,[128] within two months of the concerned decision.

After granting and exhaustion of all possible procedures before the EPO, the granted European Patent is thereafter sent to the members' national offices which were previously selected by the inventor—that will require further formalities, mostly fees and translations. Competence over the patent is therefore transferred to the designated national offices and legislation: any future objections to the patent validity or infringements will be prosecuted in the courts of the member state, using its national laws.

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[124] Art. 94 EPC

[125] Rule 71.1 EPC, which is the only moment in the EPO procedure which an applicant can modify the claims—amend.

[126] Normally, provision of the translation of the claims in the two remaining official languages.

[127] Mostly by providing documentary evidence to show that a patent should not be granted.

[128] Art. 106 EPC. In cases concerned with particular points of law, an Enlarged Board of Appeal shall be referred to, Art. 112 EPC.

USPTO procedure

The establishment of the USPTO followed the statement of the art. 1§8 of the American Constitution, to "promote the progress of science and the useful arts." The Congress of the US issued laws related to the patent system of laws related to the patent system under title 35 USC.

With the advent of global trade, companies have reason to seek worldwide protection for their inventions. To do so, companies must generally obtain and enforce a patent in every country where protection is desired. For any company outside the US willing to procure and enforce patent rights in that country, a clear understanding of US patent law is vital. There are many differences between the European and US patent systems—some clear, some subtle—, including filing of patent applications, procedures after grant, and litigation of patents.

These are some of these differences between US and the standard patent processes, being the latter already presented in section **2.6.1**.

First to invent. In the US, patents are granted to the first person who invents the product or process, and not the person who presents the first application—which is the rule on the rest of states. As such, third inventors could allegedly retain a patent presented by prior applicants. It is therefore worth remarking the usefulness of keeping inventor notes and records when applying for an international protection, including the US.[129]

Grace period. As referred to in section **2.3.1**, the US is one of the states that dispose a 'grace period' for the valuation of novelty of an invention. During the year before the presentation of the application, the inventor may publish any disclosure regarding the subsequent claimed invention, i.e., in media such as academic reviews.

Legal duration of patents. Since 1995, year in which the TRIPS entered into force in the US, the legal duration of patent rights has been of 20 years from the priority date. Before that, it was 17 years after concession.

[129] Effect further discussed in section **2.5.2**.

Renovation fees. In most patent systems, renovation fees are maintained in a yearly basis. Due to the prior legal duration of patents, discussed in the previous point, renovation fees in the USPTO are paid at the years 3, 5, 7 and 11½ from granting.

No examination request. Contrary to the patentability examination on-demand issued by the EPO, in which the applicant has 6 months after receiving the search report to request examination, the USPTO automatically considers this application as made. This is problematic for inventors who, in the light of the search report, could easily figure out that their invention is obvious or not new.

Publication of the application.Before 1995, applications were published only once the patent has been granted, or not published at all if requested to do so by the applicant. Currently, applications are published 18 months from the priority date, although there may be exceptions.[130]

'*Duty of Disclosure, Candor and Good Faith.*'[131] When presenting a patent application, solicitors are compelled to include a list of documents that, in their opinion and knowledge, could be relevant to the effects of determining novelty or non-obviousness of the patent. It is indeed a legal requirement, and not providing the data required could entail nullity of the patent application. In a quite evident consequence, applicants were including a vast number of documents into the compulsory 'state of the art,' hence forcing the USPTO to change the maximum number of references to 25, in the year 2005.

Provisional patent application.[132] The USPTO offers the possibility of presenting a provisional patent application, thus permitting a first application and priority date at a lesser cost—because no patentability exam is done. Claims and disclosure are not required to be fully written, but further changes should be realized on the application to permit continuation towards the granting process.

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[130] 35 USC 122b.2.B.i . There is a possibility of presenting a petition of non-disclosure, provided the applicant is not going to present an application in another country claiming the priority date of the US application concerned.

[131] 35 USC 301

[132] 35 USC 101b

Claims' amendment.[133] Solicitors may amend the claims of their application after the initial filing, to an extent substantially broader than what is permitted at the European offices. These changes could be done after new progress on the applicant's research, or as a reaction to examiners' requests. Thus, concession could be gradually delayed. This process could even begin two years after granting of the patent, in case of any deficiencies in scope of the written claims.

Both the procedure of patent granting at the EPO and the USPTO are displayed in Annex C.

2.6.4 International process – The PCT

The Patent Cooperation Treaty (PCT) is a multilateral treaty that came into force in 1978,[134] administered by WIPO. The member states of the PCT[135] establish a Union for cooperation in the presentation, searching and examining of patent applications.

The scope of PCT is to increase easiness to processing applications for patent protection, when such protection is to be obtained in a various states. It establishes a system in which the filing of a single application produces the same effects as if the application would have been filed in each of the countries designated by the solicitor.

The PCT is not a process of patent granting, and therefore does not substitute the national concession; it is a system for unification of previous processing of granting. So, by this means an international application *does not* result in an actual 'international patent.'

A brief presentation of the PCT procedure follows for illustrative purposes; a graphical representation of the procedure could be consulted in Annex D.

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[133] 35 USC 201

[134] The PCT was signed in 1970, and entered into force in 1978. In May, 2011; 143 state members formed the PCT.

[135] See Annex E.

The PCT procedure

In accordance with the PCT, it is possible for solicitors to file international patent applications. An international patent application results in further possibility of obtaining patent rights for an invention in different countries.

By means of a PCT application, the solicitor can delay the decision to apply for national and regional levels as far as 30 months from the application—as opposed to the 12-month period of the Paris Convention. Payments of fees and translations corresponding to national filings could be done relatively later on, thus benefiting the applicant with more information of the market value of the patent before confronting higher costs.

The PCT process consists of two fundamental phases:

1. the international phase, which is performed at the designated national (or regional) offices, the International Office (WIPO), and the Administration committed to the international search and the international preliminary exam; and

2. the national phase, which takes place in the national offices of the designated states.

The international phase starts with the filing of the international application, directly in a national (or regional) patent office of a PCT member—up to 12 months from the priority date of a previous patent national filing—, or directly at the WIPO.

After reception, the patent application is transferred to one of the International Search Authorities (ISAs)—which are national offices specially designated by the WIPO to carry out the search process. The ISA prepares the International Search Report (ISR),[136] which is essentially a report analogous to the ones prepared by national offices: references to documentation, both patent and not-patent literature, affecting to the invention patentability. ISRs are accompanied by a written opinion on whether the invention seems to comply with the patentability requirement, this said opinion being non-binding. The ISR is published

[136] Art. 18 PCT

with their corresponding applications 18 months after the priority date[137]—the written opinions are not published.

After receiving the ISR and the written opinion, and before the 22nd month from the priority date, the applicant may demand an International Preliminary Exam (IPE), which will entail a preliminary report of the patentability—a second evaluation about the potential patentability of the invention. If the applicant does not ask for the ISR, the written opinion will be the final ISR.[138]

After that point, and the 30-month period after the priority date reached, the national phase starts. The applicants may apply for a patent in every country selected to effectively protect their inventions. At this point, it is also possible that, instead of filing a national application, the applicant may file a regional application,[139] which would be solved afterwards.

As it has been previously discussed, the PCT application must end in several national applications to achieve effective protection.

Henceforth

To summarize, after selecting the countries in which protection is sought, the options for the applicant are:

a. to apply to the national office of each country separately and follow their procedures;

b. to group some national applications at regional offices, such as the EPO; and

c. to apply via the PCT for some or all of the countries and then proceed to a combination of regional and/or national offices, the regional offices leading automatically to national offices.

In spite of the different possibilities, international companies demand further harmonization of the patent system. Practical and economic barriers arise when businesses need to apply at

[137] Art. 21.2a PCT

[138] Art. 34.3c PCT

[139] I.e., in the case of the EPO, the Euro-PCT.

different patent offices, when seeking global protection for inventions. Indeed, the principal world patent offices—USPTO, EPO and JPO—do not have a standardized register mechanism, meaning further costs to these companies.

Likewise, some patent offices are according cooperation towards a sole patent system.[140] In any case, a single global international patent system is far from being a reality, as LDCs are quite aware of what a powerful tool it could be for MNCs.

On the contrary, regional patent offices are being created, notably following the increasing of regional free-trade and commercial agreements. Patent system harmonization is a corollary of economic interdependence, stronger in regional blocks.[141]

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[140] Work-sharing pilots between patent offices, as the 'Patent Examination Highway' and 'Patent Prosecution Highway' between Japan, China and South Korea, which provides a rationalized application and prosecution. SIPO, *SIPO and JPO to Commence a Pre-Pilot of Patent Prosecution Highway between Both Offices,* 2009, http://english.sipo.gov.cn/news/official/201105/t20110511_603901.html (accessed May 19, 2011).And similar USPTO and IP Australia cooperation on patent search and end examination. USPTO, *United States and Australia to Extend Cooperation on Patent Search and Examination Services,* 2007, http://www.uspto.gov/main/homepagenews/bak2007feb07.htm (accessed May 19, 2011).

[141] ACC1Ó, *Informe anual OME 2008: Un món policèntric: la cursa pel talent, la tecnologia i el capital: Crisis i transformacions en l'economia global* (Barcelona: COPCA, 2008), 126.

3 THE BIG PICTURE – SOCIAL & ECONOMIC ISSUES

In this chapter, the patent system is portrayed as a conceptual 'balanced model' between the interests of innovative agents and society. The most challenging issues concerning this ideal model are outlined—either inherent to the patent system or external to it. In this sense, the patent system economic framework, as well as its relations to both global and business levels will be presented.

What follows is a brief description of the justification of the patent system over the years, from its origins to the present. The Principles of the patent system itself will be discussed next.

3.1 HISTORY AND EVOLUTION OF THE PATENT SYSTEM

The first approach to a system of protection of inventions is the *Edict of Venice*, a Venetian law of 1474, where inventors were awarded with an exclusive right of 10 years if the invention was found useful. Before that, inventions were typically kept in secret. The primary role for patents[142] was the transfer of industrial knowledge from inventors and foreigners for the nations' benefit. The idea of public disclosure of an invention, in return for an exclusive right, spread through Europe in the following centuries and, eventually, to the *new world*.

The concept of inventions' exclusivity protection was followed by the Tudor English *Statute of Monopolies*, under King James I in 1623. This law provided for the first time for the grant of a monopoly for an invention during a limited length of time. During the centuries XV to XVIII, patent systems were better understood as 'privileges,' that is, inventions became state property, with private and exclusive right of use to inventors. The patent system at that time was the expression of the power of the state, arbitrary in its forms.

[142] The etymology of the term *patent* comes from the Latin *literae patentes*, or 'open letter.' The term *letters patent* historically refers to sealed letters read as royal proclamations in thirteenth-century England.

The privileges granted by patent systems were calculated in terms of benefit given to society. And this principle was long recognized: to a point that it was a fundamental part of the American Constitution of 1787.[143] Trade and industry flourished in the second half of the eighteenth century in many countries—as well as scientific advancement, artistic creativity and political revolution. In France, the first patent law was established in 1791, after the French Revolution.

In the modern world of the nineteenth century, the patent system's principal characteristic was the liberal background, and the granting of rights in a regular and legal basis, without the arbitrary nature of past systems. It is in the second half of that century, when patent laws had been already enacted in several countries and goods and workers started crossing national borders, that the need for off-territorial protection arose. Following an incident related to this lack of international protection,[144] the first major treaty in IP protection was established. The Paris Convention for the Protection of Industrial Property was signed in 1883, allowing inventors of one territory to obtain protection for their intellectual creations in other countries—patents, marks and industrial designs. Patents became the backbone of the industrialization process, and companies were established on the basis of a single patent.

The evolution towards international harmonization of the patent regime further developed in the twentieth century. In 1970, under the recently-created WIPO, the settlement of the PCT defined a common process for filings and initial stages of patent applications in the different territories. In the 1980s, further attempts at harmonizing the IP law were attempted within WIPO, before shifting the diplomatic scene to GATT. The results of the negotiations culminated into TRIPS, which entered into force in 1995.[145] At the same pace, there has been an evolution towards regionalism of the patent system, seeking common economic interests and gaining negotiation power.

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[143] Included in art. 1§8 of the US Constitution. The principle behind patent systems also boosted the creation of the US Patent Commission in 1790, 'created to promote the Progress of Science and Useful Arts.'

[144] Foreign exhibitors refused to attend the International Exhibition of Inventions in Vienna in 1873 because they were afraid their ideas would be stolen and exploited commercially in other countries. In WIPO, *Summer School on Intellectual Property*, 13.

[145] The TRIPS agreement is discussed in following section **3.4.2**.

Overall, philosophy and justification of the patent system has changed radically during its history: from being justified in the 'natural law' and used mostly by individual inventors, to mainly having economic meaning nowadays and used by corporations to control global commerce.

3.2 PRINCIPLES OF THE PATENT SYSTEM – BALANCED MODEL

The declared objective of the patent system is to promote innovation, and therefore technical progress. It is achieved by a system of balanced compensation: a temporal right for exclusive commercialization of the invention, in exchanged for public disclosure of the idea. By means of offering useful protection and exclusivity, individuals are encouraged to invest time and money innovating on practical inventions, for the benefit of all society.[146] The patent is a balanced contractual relationship between the inventor and the wider society, depicted in **Figure** 1.

The 'balance' of the system is at the heart of the patent granting process, and is an appropriate model for the benefits (knowledge) and disadvantages (monopoly) in which the system incurs. On one hand, the possibility of obtaining a patent right is an incentive to innovate[147] for the overall benefit of society. With a limited monopoly, patent owners are allowed to sell the technology above the market price, or transfer it to others, converting patents on negotiation tools, recouping the costs of research of the invention, thus permitting even future innovations, and eventually enabling the movement of resources in the market.

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[146] According to art. 7 TRIPS, "[t]he protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conductive to social and economic welfare, and to balance of rights and obligations."

[147] The correlation between patents, innovation and economic growth has a hegemonic view in institutional sources, and is implied during the study. However, it is still an issue where the academic opinion is divided. SCOTCHMER, GUELLEC and VAN POTTELSBERGHE hold the point of view of patent systems increasing innovation. MANSFIELD disagrees with the proposed model. Guellec, D., van Pottelsberghe, B., *The Economics of the European Patent System* (Oxford: Oxford University Press, 2007); Scotchmer, Suzanne, *Innovation and Incentives*, (Cambridge: MIT Press, 2004); Mansfield, Edwin, *Intellectual Property, Technology and Economic Growth* (1990).

Empirical proving concerning patents and innovation can be found in Hu, Albert, *et al.*, *Patent Rights and Economic Growth: Evidence from Cross-Country Panels of Manufacturing Industries*(2009).

This exclusive exploitation of their invention is barely achievable by means of maintaining the invention secret. Also, by allowing disclosure of the invention, future efforts of R&D are focused on novel areas, avoiding duplicated research efforts.

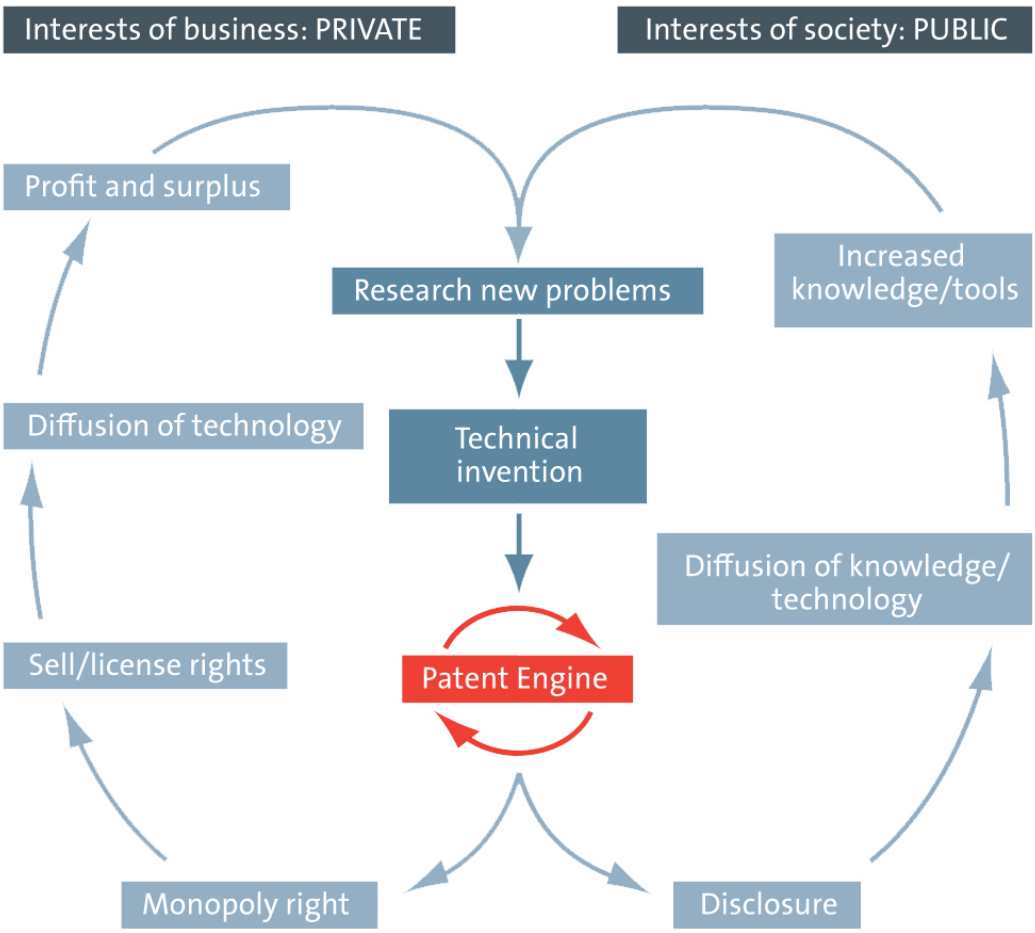

Figure **1** – The patent system model

(the same model, with its flaws depicted, can be found in Annex A)

Source: EPO, *Scenarios for the Future*

On the other hand, granted patents also have some *ex post* costs to society. By means of granting a legal monopoly to a patent applicant, the competency in the market is limited, with the products patented offered at higher prices.[148] Incentives given to innovators have to be balanced with the public interest of consumers, so that the access to the products is not excessively hampered;[149] but these incentives also have to be balanced with the rights of competing businesses, so that they can enjoy innovation and development on their own. Patent rights limit production competence, but promote competence in innovation.[150] And, not to forget, patent systems also incur in some elevated costs, both to the inventors (patent applications and fees) and to its internal administration.

3.3 CHALLENGES FOR THE PATENT SYSTEM – UNBALANCED MODEL

The theoretical base of the 'balanced' patent system already presented is not free of criticism, with respect to its overall beneficial character. Although historically there have been episodes of skeptical views over the patent system,[151] it is in the final decades of the last century that actual discontent voices began to be heard and become a wider trend than ever.

The patent debate is centered over different issues: those intrinsic to the patent system and those extrinsic to it—affecting markets, economic development, and technological innovation. The extrinsic effects of the patent system will be addressed in the following chapters; the inherent issues will be discussed in this section.

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[148] This could affect the market in different ways, but essentially, some consumers are excluded from acquiring the product (willing to pay the marginal cost of the product, they are not willing to pay the surcharge to the patent holder). Others consumers would use substitutive products with lower prices, even if they require more resources to manufacture.

[149] Which is more important in the case of LDCs, with an already hampered access.

[150] Llebot Majó, Josep-Oriol, *La propietat industrial (I): El sistema de patents* (Barcelona: Fundació UOC, n.d.), 10.

[151] And even more drastic measures: the abolition of the patent system in the Netherlands in 1869, not reestablished until 1912. Macleod, Christine, *The Patent Controversy in the XIXth Century* (Bristol: University of Bristol, 2005).

Protection of new fields of technology and ethical issues

From the industrial-based knowledge protected by patents during the nineteenth century, society is moving towards other goals. New technical fields, for instance biotechnology, have incremented their relevance during the second half of the twentieth century. This technology has become patentable in some countries over the years,[152] including examples extremely controversial. Several landmark patents over 'life' have caused broader debate on the ethical issues concerning patent systems,[153] with attention to patents related to embryonic stem cells.[154] In these cases, social fears over the nature and risks of technological research are at the focus of the discussion—not *exactly* patent systems' position.

Moreover, ethical matters governing patents are today concerned to issues related to least-developed countries (LDCs). Monopolies granted in fields such as agricultural and medical technologies encourage civil society debate on the undesired social and economic effects of the patent system—primarily, limited access to corporative patented goods, such as AIDS drugs and essential food crops. But these issues reveal different political outlooks more than conflicting interests.

Quality of granted patents – High number of applications

At the core of the patent system, 'quality' measures a patent's degree of validity and it maintains the desired balance between incentives to inventors and third-parties rights. Indeed, low-quality patents produce all the inconvenient effects of a monopoly while reducing the benefits for the public. Patent offices, by means of the procedures of search and examination,[155] ensure the balance between the reward to the inventor and interest of society, and thus they maintain a level of validity by discarding patent applications that are considered 'obvious.' Substantive examination carried by the offices aims at achieving

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[152] Patentability criteria vary in the different national and regional patent systems.

[153] I.e., the Edinburgh Patent case (European Patent No.0695351) in 1980, on animal embryonic stem cells; and the different Oncomouse Patents in the 80–90s.

[154] It is arguable that the use of embryonic stem cells is sufficiently pre-empted by the excluding of patent matter "contrary to 'order public' or morality." Art. 53.a EPC.

[155] The patent application process and patent offices' work was presented in section **2.6**.

quality but, more often than not, examination is constraint by both time and assessment limitations, caused by the overall patenting proliferation.

The increasing number of applications is an evidence of the importance and success of the patent system. However, the growing number of these patent applications has led to important blockages of the patent granting system. Patent offices face a high volume of applications, which create backlogs[156] that could lead to increase the rate of work at the offices. If asked to increase their pace of work, examiners could not have sufficient time to procure an adequate substantive search, and therefore they could misjudge obviousness, upset quality and cause increasing uncertainty in the granted patents.[157]

Low quality patents have higher costs to society, not only because of increased prices of exclusive products, but also because of the expenses incurred in more litigation processes.[158] Also, there is less social interest in low-quality patents, and more and more concerns about the level of quality of granted patents[159]—patent systems are there for rewarding *genuine* innovation.

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[156] A recent study by the British Patent Office states that the size of the global patents backlog is over 4 million unprocessed applications. The same study shows that the estimated losses on economic activity because of pendency delay is 7.6 billion pounds for year of delay in Europe, US and Japan (as a complementary note, average grant pendency is 3–4 years). London Economics, *Economic Study on Patent Backlogs and a System of Mutual Recognition* (London: UK Intellectual Patent Office, 2010), 44.

[157] *Ibid.*, and Jaffe, Adam, Lerner, Josh, *Innovation and its discontents* (Princeton: Princeton University Press, 2004), 20.

[158] Since patents deemed weak are predictably more challenged by its competitors.

[159] In the US, the problem of trivial patents is usually linked to a diminishing of the patent standards. Patent approval rates are higher in the US than in Europe and Japan. At the USPTO 99% of patent applications are approved, contrary to roughly 65% in the EPO and JPO. The small quantity of examiners per application (34,000 examiners for 350,000 applications a year in the US, with a time of 11 to 22 hours per patent) is considered not enough. USPTO, as other offices, is financially based on patent fees (which are paid only if the patent is granted), so it is accused of having the incentive to process applications quickly rather than diligently, and with higher approval rate. Jaffe, Lerner, *Innovation and its discontents*, 4–6.

3.4 ECONOMIC GLOBAL ROLE OF PATENTS

The patent system—and, in a broader view, all IPR management and protection—is, and has always been, a matter of states, of protection within their borders. However, on the last quarter of the century non-state actors, such as MNCs and international NGO, have played an increasing role, and the same can be said of supra-national actors, such as WIPO and WTO, and regional institutions.

3.4.1 Governance, globalization and development

The roots for the gradual switch from traditional state governance towards international political powers can be found in economic liberalization and globalization. From the traditional situation of centralized power of the nation-state, the situation has quickly moved to an increasing decentralization of political decision-making and witnessed a drastically reduced role of the state institutions. The result has been more economical freedom for organizations and individuals. The political power of the state has decimated, and new sources of authority have appeared, with relations trespassing traditional territorial boundaries. This territorial openness towards international trade and investment has made globalization possible—the cultural, social and technical interaction between countries—and has leveled up inter-state authorities globally.

Companies are also turning to international expansion and foreign investment, interested in moving to regions with lower labor costs. In the ICT field, particular global service sectors, with virtually no physical barriers, can just be anywhere in the world. Globalization is indeed proving beneficial to some, but its benefits are not so evenly distributed between all countries. This unbalanced scenario has caused the rise in the latter years of a number of social dissenting groups that oppose global trade and its economic policies. Also, emerging countries are reticent about the neutrality and legitimacy of the geopolitical system. The governance of the global trade system is questioned.

In this sense, current shifts in IP-related trade issues, which will be further discussed in this section, are marking the agenda of players at all levels: nations, and regional and international bodies. Although a 'global' patent system has been around for some time—from the Paris Convention of 1873—, patent systems are managed basically on a territorial basis, with overall governance by regional and supra-national institutions, such as WIPO.

These three levels—national, global, regional—coexist, always negotiating and competing. Whereas at a national and regional level institutions focus on concerns over country innovation and competitiveness, at a global level, the collision between Northern v Southern states over development issues concerning patents marks the agenda. Moreover, emerging countries are now questioning the role IP plays in development, as well as the fact that it is under control of the rich countries. Indeed, technology transfer is central to economic growth and development,[160] no wonder, then, that critical voices argue against the fact that industrialized countries are seeking commercial interests by means of patent system regulation, under the former blessing of WIPO.[161]

Patents and IP have played a crucial role in the geopolitics of globalization and in technological development and technological for many years. The economic development of many countries is what is now at stake.

3.4.2 IP and trade – The TRIPS agreement

MNCs, companies operating at a global level, have always been eager to reduce differences in the regulations concerning patent systems, as they are source of increased patenting costs and legal uncertainty. In the 1980s, industrialized countries and markets pushed WIPO towards global IP law harmonization, which would have meant stronger protection of patents rights for its members. Developing countries refused at that moment the introduction of these higher global forms of protection.

Lack of results during that period switched the negotiation field from WIPO to the Uruguay's trade round of GATT (General Agreement on Tariffs and Trade) on 1986. Profiting from the expanded competences of GATT, which also included agriculture—an important aspect of global trade for developing countries—, IP started to be connected to trade. This was the capital step towards enforceable results: the Uruguay's round of GATT

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[160] "The ability of countries to acquire, master, adapt and improve upon scientific and technical knowledge is a major determinant of their capacity to achieve sustainable economic growth." In United Nations Commission on Science and Technology for Development, *Issues Paper on 'Bridging the technology gap'* (UNCTAD, 2005), 5.

[161] However, WIPO position has shifted, and today the organization is more concerned about development issues, contrary to WTO. This is especially manifest with the proposal for a Development Agenda for WIPO presented in 2004. International Chamber of Commerce, *Current and emerging intellectual property issues for business: A roadmap for business and policy makers* (Paris: ICC, 2008), 21.

concluded with the negotiation of TRIPS, and the creation of the WTO, which would administer the new treaty, among others things.

IP regulation finally shifted towards trade regulation when TRIPS was enforced in 1995. Whereas IP policies are concentrated in WIPO, WTO's TRIPS has increasingly been taking political decisions—a move that has raised controversy, mainly because some of the principles originated for trade in goods, if applied to the non-trade context of IP, may not be suitable for all countries.[162]

With the approval of TRIPS, patents were linked to the international trading system and, more importantly, to its sanctions mechanism.[163] TRIPS signing require country members to adopt their IP protection systems to satisfy minimums requirements and precise rules for enforcement of IPRs. Its principal features concerning national patent systems are as follows:

- Harmonization of patent rights is established (Art. 28).
- Also, minimum levels for time protection of patents are implemented, determining them for 20 years (Art. 33).
- Patents must be granted in all fields of technology, with several exceptions[164] (Arts. 27.2 and 27.3).
- Not allowance of discrimination "as to the place of invention" in national patent laws (Art. 27.1).
- Enforcement procedures should be made available in every state member (Art. 41).
- No benefits for local applicants may be offered, if they are not available to other TRIPS members. (Art. 3) Most-favored-nation treatment is also included (Art. 4).

It should be stressed that failure to comply with TRIPS can result in trade sanctions.[165]

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[162] Opinion of Martin Khor at EPO, *Interviews for the Future* (Munich: EPO, 2006), 492.

[163] ICC, *Current and emerging intellectual property issues for business*, 20.

[164] Not including software and business models, which are permitted.

The TRIPS agreement—exhibiting a pro-Western bias—does not reflect the contemporary concerns about health and development. Contrary to the purpose of the Paris Convention, which enabled countries to determine some aspects of the patent system in their national legislations, TRIPS denies that flexibility to developing countries.[166] Eager use of the IP system in the last century at the service of developing objectives proved successful to some of them.[167] The 'copycat' effect is still a very important resource for early economies.

The lack of technology transfer, and the IP constraints on LDCs included in TRIPS lessen the ability of technology exploit and innovation.[168] Likewise, debate increased and Article 66.2 of TRIPS was formalized, which encouraged technology transfer to LDCs from foreign enterprises.[169] According to analysis, the provision has received little attention.[170]

The concerns of LDCs with TRIPS, led to the Doha Declaration on the TRIPS Agreement, in 2001,[171] which included flexible provisions concerning public health. These measures include the use of patented drugs in emergencies related to epidemics (as AIDS or tuberculosis) by any possible means;[172] and the possibility to delaying the introduction of drug patents into national legislations until 2016. In the same sense, it has also been proposed a WIPO Development Agenda,[173] with a focus on development aspects of IP, mainly technology transfer and delivery of technical assistance.

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[165] Reidenberg, Joel R., "Trade, TRIPS and TAFTA," *Fordham Intellectual Property, Media and Entertainment Law Journal*4, Issue 1, Article 17 (The Berkeley Electronic Press, 1993).

[166] EPO, *Scenarios for the future*, 59.

[167] I.e., South Korea and Taiwan, which refused most part of foreign patents during their economic take off (late 60s), in part because their local industry was founded on imitation. Latrive, Florent, "Propriété intellectuelle: les pays du Sud se rebellent," *Libération*, September 20, 2004.

[168] As scientific programs improve human capabilities, and technology boosts productivity and increases economic growth.

[169] Art. 66.2 TRIPS "Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base."

[170] United Nations Commission on Science and Technology for Development, *Issues Paper on 'Bridging the technology gap'* (UNCTAD, 2005), 11.

[171] At the time of writing (May 2011), the Doha round is still not concluded.

[172] Measures including compulsory licensing and 'grey imports.'

[173] Leaded by Argentina and Brazil, in 2004.

On the other hand, given the slow progress renegotiating TRIPS,[174] most developed countries (notably the US) chose to increase pace of this economic agreements relating to IPRs. Some bilateral and FTAs include now the so-called 'TRIPS-plus' clauses, which impose higher standards, extensions to patent rights and more limited exceptions to LDCs as the original TRIPS itself.[175] The limitation of the use of compulsory licenses and the increment of exclusivity rights is a sensitive loss with regard to the Doha Declaration. Reports[176] insist in the fact that the stricter TRIPS-plus clauses are contrary to development: stronger patent regimes encourage MNCs to stop production and investments in the country.

3.4.3 The power shift eastwards

IPRs are an important component of current trade agreements. The presence of WTO and the TRIPS agreement integrate an almost universal framework, defined by the northern-western block. The increasing balance of geopolitical powers around the globe is bringing other countries to the patent system, interested in exploiting it, thus breaking the traditional domination of patent superpowers—US, Europe, Japan.[177]

Industrial manufacture has already been moved to the south and east, and now is R&D that is shifted to these countries—notably China and India—, because of lower workforce costs and shorter distance to emerging market forces. As an effect to this shift of research, "this will lead to a clear knowledge transfer towards China, irrespective of who the owner of the IP is."[178]

Technology transfer accelerates development, and emerging countries are eager to make use of IP systems. International protection of innovation is really precious as a national

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[174] See note **171**.

[175] Examples of FTAs including clauses considered TRIPS-plus can be found at The World Bank, *Global Economic Prospects: Trade, Regionalism, and Development* (Washington: The World Bank Publications, 2005), 66.

[176] *Ibid*., 98.

[177] Which in fact defined the contemporary IP regimes. "The forces that pushed for the harmonisation of laws that resulted in the TRIPS Agreement are very well known. They are the big industries, the drug industry, the motion picture industry, those industries that wanted to have a higher standard of intellectual property in countries outside the US and the EU." Martin Khor at EPO, *Interviews for the Future*, 480.

[178] Joseph Straus, at EPO, *Interviews for the Future*, 286.

competitive advantage and to dynamic technological fields.[179] The new geopolitical and technological muscle of emerging countries can disrupt the current global patent dominance of existing superpowers.

3.4.4 Patent systems: North v South

Developing nations do the R&D, the manufacture, yet still they don't see the revenues of the developmental advantage of IP. Traditionally, technical information was received in exchange for local protection, and goods and wealth were produced. Developing states see, on the contrary, an increase of the international licensing revenues to developed countries.

Most developing countries lack an IP strategy linked to development. These countries have to develop a strategy appropriate to their level of development, and analyze carefully IPR provisions in the RTAs, but it is not always an easy situation.[180]

The orthodox approach is: the higher the IP standards, the more innovation and technical growth, and therefore, progress. But on certain levels of development, this approach may not be true.[181] Developing countries, with little economic flexibility, have more to gain from shorter patent terms for foreign innovations, since that facilitates the spread of new technology and the diffusion of ideas.[182]

The TRIPS agreement does not address certain issues concerning LDCs and their integration to a global patent regime, such as the effects of IPRs at certain economic levels, the overwhelming of national patent systems by foreigners, and the monopolies and higher prices, not affordable by poorer consumers.

In my opinion, the effect of strong patent rights in developed countries, with business and individuals strongly formed in IP, is surely beneficial for improving innovation and economic gain. On LDCs, however, strong patent protection is a backdoor opened for foreign capital to exploit them.

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[179] OEPM, *Plan PI: Plan de promoción de la Propiedad Industrial en España 2010-2012* (OEPM, 2009), 8.

[180] The World Bank, *Global Economic Prospects*, 72.

[181] Martin Khor, at EPO, *Interviews for the Future*, 492.

[182] Surowiecki, James, "Exporting I.P.," *The New Yorker*, May 14, 2007.

3.5 BUSINESS – PATENTS AS STRATEGIC TOOLS

Current market economy is more and more based on a knowledge paradigm. This fact is increasingly changing market priorities. Businesses are largely relying in patent rights and other IPR—intangible assets—not only for its functionality to maintain monopolies, but also as financial assets. Indeed, patents are beginning to generate profits and strategic advantages for companies; so much so that physical assets are losing importance in the overall value.[183]

In today's interconnected world, businesses are becoming borderless and consumers are less and less concerned about the origin of the technological products they use. Companies are outsourcing their production and research, allowing other companies to take over part of the value chain. They generate revenues with their products, even if they are actually not making anything—patents are changing their value. In this intensely globalized system of patent protection, businesses argue for predictability.

Too much economic value is at stake and companies are quite aware of this. Beyond the legal procedures and technical nature of patents, there is a business strategy that drives patenting interests—the pursuit of a patent portfolio requires the consumption of both human and financial resources.

Businesses are therefore increasingly seeking protection based on patent rights, either from internal innovation or by acquiring third-party patents. The business motivations behind this patenting boom that has evolved over the last 30 years are numerous: commercial exploitation, licensing, cross-licensing, protection, hamper competition and reputation.[184]

3.5.1 Patents and competitive technical strategy

The primary application of patents is to protect inventions in a way that allows its commercial exploitation, thereby justifying the prior investment. But, as pointed out before, patent rights are developing from being a mere protection for company's innovation to

[183] Physical assets—property, plant, machinery and stock—represent no more than 40% of the value of world's publicly traded companies. This represents intangibles for value of $19.5 trillion of global market value (from a total market value of $31.6 trillion, in 2007). According to Brand Finance, an intangible assets consultancy, cited in EPO, *Scenarios for the Future*, 34.

[184] See also Annex K for a complete list of business motivations.

becoming valuable property, a tool even capable of generating revenue *per se*—by licensing. Therefore, patents are more and more being considered as strategic business tools, with the overall purpose of increasing revenue.

Businesses interested in patents' beneficial value are probably increasing their R&D budgets, but to transform the results of the research into a patent portfolio they also require a solid patenting strategy.[185] Patent generation at any cost is probably not the only consideration when conducting innovative research in a given field—as innovation is intrinsically unscheduled. Nevertheless, having a clear understanding of the patent process and incorporating it into the R&D work method is, at least, a guarantee for a better cost-effectiveness.

Cost and value of a patent will be considered in this analysis, following the classical economic theory of value. The balance between cost and value would be specific to each applicant business, and most often than not, also specific to the patent they want to issue. The certainty of costs should be therefore balanced with the hypothetical benefits. Once a company has achieved a patentable invention, it should develop a plan of proceeding, given their financial position and risk perception.

Framework

To set up a competitive technical strategy will require: a good understanding of the new invention's field, its competitive environment, the future market of the invention and its chances within this market.

What follows is a description of the main elements affecting patent strategy decision-making.

a. Size and type of business

Strategic patenting has a wide range of objectives depending on the different economic actors present in the patent game, being financial disposability and appetite for risk among the most salient traits of such strategy. The study will be centered in some archetypical economic players: individuals, SMEs, large companies and public research institutions.

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[185] Junghans, Levy, *Intellectual Property Management*, 35.

i. Individual inventors

Due to current innovative processes and costs of proper research in highly technical fields, inventions coming from individual inventors are not as numerous as they have been historically. For an independent inventor, filing a patent means high (or totally impractical) costs, and normally has to secure financing by external means.

Inventors notably follow all the process of protecting their inventions for a future monetary compensation.[186] Provided there is an economic incentive behind patent application, inventors pursue the creation of a business start-up for the commercialization of new products. In addition to the inherent costs of a patent application, the set up of a business will certainly become a financial obstacle, just as cumbersome as the patent process. In that case, independent inventors could consider licensing their products, form a joint-venture, or make an outright sale of the patent. Each one of them has a clear focus on generating economic value, with different levels of risk.

Independent applicants should, therefore, pay attention to the framework they are about to enter with the products or processes to which protection is sought; substantively, the market and existing competition in the field. Litigation with a competitor—whether is a plaintiff or defendant—is, as a general rule, impractical for individuals.[187]

As has been previously emphasized, individual applicants should be concerned with their financial position through the process of patenting. Inventors willing to apply for a patent would only do so by obtaining public or corporate sponsorship, which could require compulsory licensing. Or, more drastically, they could sell the invention to a company, bypassing the patenting process.

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[186] One way or another, patents are used to provide a direct or indirect economic benefit. In Why Do Start-Ups Patent there are presented the basic reasons or primary driver to patenting. Every one of these drivers had an economic interest, with the exception of the latter: "some inventors just want a patent so they can frame it and put it on the wall;" in Graham, Stuart, Sichelman, Ted, *Why Do Start-Ups Patent?* (2008), 2–6.

[187] Even though, US case law has seen litigation cases in which an individual inventor successfully sues a company for patent infringement. I.e., the case of Mr. Kearns and the lawsuits against GM, Chrysler and Ford, concerning a patented windshield wiper. See Seabrock, John, "The Flash of Genius," *The New Yorker*, January 11, 1993.

On the other hand, patent protection could give the necessary funding *élan* for an independent applicant to generate a start-up. In this regard, it is worth observing that business investors are generally more interested in the person than in the idea.[188] Occasionally, individual inventors can also be the workers of a company. Their status with respect to the ensuing patent has been discussed in section **2.5.3**, and is defined by the territory, the invention's field, the company, and the contract. In some circumstances, worker inventors can keep ownership of rights.

ii. SMEs

Small companies are faced with different challenges by reason of their size.[189] In the Darwinian market of today, patent protection is often vital for this type of enterprise if they are seeking to grow independently; failing to grow independently could result in cannibalization by larger companies.[190] Having a market share secured by patent protection—ideally a monopoly—could provide a beneficial position from where to grow.

A large proportion of the innovation in enterprises is not the result of casual invention, but the consequence of opportunistic and systematic R&D activity.[191] Investments are therefore required, with the involved risks. If at first this circumstance could seem hampering for SMEs patent activity, the fact is that the relationship between the patent system and SMEs is particularly fruitful. Indeed, SMEs and start-ups are largely associated with creativity and innovation.[192] The virtue of the marriage between patent system and innovation is debatable, but there is no doubt that the entrepreneurship in highly technological fields must be

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[188] When investing: few individuals possess all the skills to develop an invention; investors reluctant to back one-person ventures; many businesses will not deal with individuals.EPO *Inventors' Handbook* §5.3.

[189] Although the exact number is not important for the study, SME will be referred with the EU designation, that is, of 10 to 250 employees.

[190] EPO, *The economic importance of patents* (Munich: EPO, 2008).

[191] Keupp, Marcus, *et al.*, *SME-IP 2nd Report: Economic Focus Study on SMEs and Intellectual Property in Switzerland* (Bern: Swiss Federal Institute of Intellectual Property, 2009), 10.

[192] Bosma, Niels, Harding, Rebecca. *Global entrepreneurship monitor: GEM 2006 results* (London: GME, 2007), 16.

accompanied by a certain level of innovation. And it is precisely the protection of this innovation the main reason explaining patenting behavior of SMEs.[193]

In the field of ICT, SMEs are challenged by global markets, and it is usually the case that the former lack the necessary assets—both financial and immaterial—to reach consumers worldwide. Specialization and collaboration is, then, crucial for SMEs to maintain competitiveness, and application of patents on contract negotiations and cross-licensing is desirable or highly recommended. Another important use of patents for SMEs is technology licensing for economic revenue. Notably for start-ups patents are also considered a way of rising finance during the starting phase.[194]

But SMEs face also important barriers in the use of the patent system. First and foremost, they face direct costs: applying for a patent in the principal economies of Europe or worldwide could really hamper global aspirations of a small company.[195] Furthermore, the difficulty of monitoring whether infringement is committed and the overwhelming costs of litigation processes could be devastating for a small enterprise. Protection takes too long to materialize for SMEs to achieve full resourcefulness of the patent—being it protecting the industry or financing. SMEs are concerned about uncertainty of the patent system, and an unfair perception is present in studies and surveys.[196] As a result, currently SMEs make very little use of the patent system: not only the actual number of applications is very small, but also they do not resort to the disclosed material that thirds' granted patents could provide them.

iii. Large companies

As pointed out before, patents and other form of IP are an increasing value for large companies: patents guarantee rights and positions in the market that, in most jurisdictions,

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[193] Keupp, *et al*., *SME-IP 2nd Report*, 39

[194] Graham, Sichelman, *Why Do Start-Ups Patent?*, 4.

[195] Not only that, but also translation costs, and attorneys.

[196] Radauer, Alfred, *et al*.,*SME-IP 1st Report: Support Services in the Field of Intellectual Property Rights (IPR) for SMEs in Switzerland – A Review* (Bern: Swiss Federal Institute of Intellectual Property, 2008), 95.

are otherwise prohibited. The focus of a technical big enterprise is therefore the development of a strong patent portfolio to achieve the better possible trading position.

In a traditional development of a patent strategy based on engineers and attorneys the aim was basically to decide what inventions to patent and in what countries. Current patent strategies, however, require taking into account a wider range of company departments, including their different perceptions and responsibilities. It will take no less than the combined effort of engineers of R&D departments, product managers, marketing, commercialization, executive managers and legal counselors to achieve an overall company patent strategy of a company. For example, engineers could focus on a first-to-market basis and business development could focus on licensing or using patents to force deals.[197]

Large companies, in contrast with all the other agents previously discussed have a totally different financing and risk perception. This fact provides these companies with a higher variety of possible uses of their patent portfolio: from licensing and cross-licensing to internal use for product protection; or even more 'dubious' actions: i.e., use patents to block competitors and set a litigation base. Given the previous list of patents' beneficial uses, large companies usually deploy researchers and attorneys to evaluate opportunities for exploitation of their patents in the technology landscape. Their surveys will likely cover other key companies participating in the market in order to determine whether they are future competitors, partners or potential acquisitions.

Indeed, historically, bigger companies have been considered stronger in patenting; in fact, propensity to use patents and other IPRs increases with business size.[198] This business propensity and reliance on their patent portfolios is changing the scope of these enterprises. Strategic deploy of patents and other IPRs could provide a company with a beneficial market position: it may become a dangerous core technology owner or a licensing-centered business.

In the ICT market, collaboration—or understanding, at the very least—between companies is crucial in the development of highly complex products.[199] Failing to do so may result in

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[197] In any case, whatever the roles played by the different departments, strategies are going to be judged closely by the stakeholders.

[198] Keupp, *et al*., *SME-IP 2nd Report*, 11.

[199] *The Economist*, "The great patent battle," October 21, 2010.

threats and actual patent lawsuits with unpredictable and often negative outcomes. Bigger companies could also use the threat of litigation to force deals with smaller companies with interesting key patents.[200]

iv. Universities and public research institutions

Historically, universities and research institutions have been one of the most relevant sources of knowledge and ideas, being companies the traditional developers for the potential market effects of those ideas. During the last two decades, changes on the legal framework,[201] the increasing value attached to knowledge, and the global openness of all economic agents have changed the philosophy of the research institutions and universities towards obtaining the maximum benefit of their research. In the era of the entrepreneurial university,[202] research priorities are being oriented towards social needs and profitable applications, with a special attention to the commercial value of the knowledge it generates—therefore, with a patent portfolio strategy.

It is not surprising, then, to hear critical voices against the new economic and patent activity of universities and public research institutions from different angles.[203] For starters, it has been pointed out that public research institutions, being funded by public capital, should not protect their research and thus prevent public access to their results. Also, some claim that the entrepreneurship of the research institutions may delay publication of the work, and restrict the free diffusion of scientific knowledge. I would argue that the academic research results are not significantly hampered by the new patent paradigm of universities. Provided that researchers do not present their results prior to applying for a patent, publication of results in scientific reviews is possible only some time after the completion of the research. It

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[200] *The Economist*, "Patently absurd?" June 21, 2001.

[201] In 1982, the US Bayh-Dole Act of *University and Small Business Patent Procedures Act* (35 USC §200-212), permitting universities to patent their research.

[202] OME d'ACC1Ó, *La innovació i la propietat intel·lectual en la societat del coneixement: noves tendències* (Barcelona: ACC1Ó, 2009), 37.

[203] Baldini, Nicola, "University patenting and licensing activity: a review of the literature," *Research Evaluation* 15 (December 2006): 202.

is not incompatible with filing a patent, and in fact the patent application is published 18 months after filing.[204]

It has been pointed out that, as agents patenting their research and not having *a priori* interaction with the market to commercialize that research, universities should be considered 'trolls.'[205] But, something can also be said to counteract such a view. In the first place, patenting has not affected the quality of university research,[206] which contrasts with the arguably lesser quality and more opportunistic patenting of PLECs—also known as 'trolls.' In addition, whereas licensing is the easiest and more common option for universities to obtain economic benefits from their work, there is also a good number of new productive businesses based on academic R&D—spin-offs.

Thus, the main uses of patent portfolio for universities and public research institutions are, primarily, to license their work to corporations and, to a lesser degree, to form spin-offs or businesses based on patented research. These activities provide these institutions with revenue, which in turn can fund new research. This virtuous circle of university self-funding, however beneficial, places the new competitiveness and economic scope of contemporary academic research once more on the spotlight. While it may be beneficial and desirable to push commercial competitiveness into universities and research centers,[207] it may be detrimental to the quality and public interest.

b. Nature of the product

Patent strategy is not only concerned with business characterization; convenience of patenting depends as well on how the products invented are going to be sold. Selling a product requires a strategy on its own. Besides the future marketability of the idea—which is probably one of the most important strategies—, companies and investors are also be

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[204] In the US, and also in other countries, researchers do not have to wait until application; they have 12 months of so-called 'grace period,' when researchers can disclose their findings, without negatively affecting patentability. See also section **2.3.1**.

[205] Lemley, Mark, *Are Universities Patent Trolls?* (2007).

[206] At least in the US.Baldini, *University patenting and licensing activity*, 202.

[207] Meneses, Juan M., *La transferencia de tecnología en la UPM: hacia una universidad emprendedora* (Madrid: UPM, 2007), 6.

interested in the manufacturing costs, the need of further development of the idea to make it saleable, and in devising ways to fit the products in their long-term business plans. Nonetheless, exceptions aside,[208] marketability of a product is as much a precondition for its manufacture as it is for its patentability.

But patents introduce some restraints of their own. For example, marketable inventions require a patenting strategy different from typical business behavior. Essentially, first-mover advantage is hampered by the particular timings of patent applications. In today's high-tech production, in which a short time-to-market is crucial, and products are rapidly replaced or improved, patents risk being obsolete after the patenting process—which typically takes 3-4 years. On the other hand, obtaining a patent for critical components of an undisclosed core mobile technology could prove very attractive, given the spread of its use.

As shown before, in certain fields, quick obsolescence and high competitiveness marks the pace of patent strategy. The same is true of renewal, as business will probably liberate their old patents if they yield no market benefits against yearly maintenance costs. In others fields, such as pharmacological industry, companies prefer, on the contrary, to delay the patenting process as much as possible in order to extend the 20-year protection given by the patent.

Developing a patent strategy requires market reports and commercialization planning—both essential elements for a patented invention as well as for an already-known product. At this point, it is important to emphasize that, after all, a patent is not *exactly* a monopoly—at least not from a business point of view. Inter-patent dependence, patent enforceability and cost issues are always casting their shadow on the day-to-day business activity.[209]

The convenience of patenting in more than one country could emerge in different ways. When a realistic commercialization plan has been developed, and international markets are within the company's objectives, it is advisable to protect the business' interests by patenting. Not having the necessary resources to market abroad, however, is not as crucial as procuring partnerships to produce and/or commercialize your products in other countries

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[208] Exceptions shall be taken into account when the applicant's aim is not commercialization of the idea, but one of the other potential uses of patent rights (i.e., licensing, cross-licensing, 'trolling').

[209] Junghans, Levy, *Intellectual Property Management*, 6.

by way of licensing. A strong patent protection is then required and, formally, also another IP, as trademarks and designs.

c. Competition

Achieving patent protection for a product does not guarantee its success. The protected invention must be translated into revenue and market share. Markets are defined by technical needs and psychological desires, not by products or inventions. Active competition of rival companies and substitutive products and processes to the patented one must also be taken into consideration.

Features of competing products or processes will often be similar to a patented invention. Ideally, excluding this competition is what an applicant seeks by patenting. As already pointed out in section **2.3.1**, it is not possible to set the scope of protection to already known competing products, but, at the time of filing, a patent applicant must think about possible technical roundabouts for the patented invention that competing companies could implement.

Preempting the competition may be done by means of broader claims—deforming the scope of the patent to protect possible roundabouts—, or by directly protecting the substitutive products. It is worth remembering that broader claim benefits should be weighed against costs (direct costs of application and more-than-probably increased litigation costs). On the other hand, some national patent legislation (it is the case of Spain,[210] for instance) requires the applicant to actually use or produce the object of protection in a given time and, as such, preemptive protection of competitive developments has added difficulties.

It is important to remark that any action based on a patent strategy towards the gaining of market place or blocking a competition advantage is to be studied in terms of costs versus benefits. Most likely, the competition of a company will present a non pre-empted product to compete with the protected one. The question is whether all the effort invested in defensive patenting could be better achieved by other means, such as marketing or branding.[211]

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[210] Art. 83 SPL

[211] Junghans, Levy, *Intellectual Property Management*, 31.

As previously noted, the size of the applicant was one of the most characterizing elements of the framework of a patent strategy patenting. Not surprisingly, the size and type of competing businesses is likely to determine the level of threat the patent applicant could expect to face in the future.

Variables

Formulation of coherent objectives of a patent strategy will require paying attention to the already defined framework. In addition to that, business eager to enter the patenting process could employ a series of variables to subtly adapt the process to its needs. Possible filing pathways and breadth of application claims are the adapting variables here.

In order to fit their needs, applicants can determine mostly at their convenience the timing and number of patents' applications, the countries selected and the sequential order to where the patent will be applied.[212] Short life cycle products, and products and processes benefiting from a quick market response, will likely need to keep the patenting process as short as possible. Conversely, patents for inventions with a steady value over the life of the patent right would benefit from delayed decision-making and late right concession. Delaying and extending the protection over time is crucial for pharmaceutical companies, whose highly lucrative products typically require more than 10 years to be prepared for the market.[213]

The possible alternatives filing strategies offer different approximations to the timely needs of the applicant. Basically, the PCT is used as a strategic waiting room that could extend the patenting process up to 5 years, giving plenty of time to the applicant to prospect the market for example. Applying in multiple national offices, on the contrary, is the quickest way to achieve the granting of a patent—and doubtless the most expensive.[214] In fact, for inventions that benefit from a short time-to-market lag, a combined solution may prove better. National

[212] Although it is possible to refer to the idea of accelerated processes of patenting on a national-only basis, it is worth centering the issue on international pathways, which provide a wider range of possibilities.

[213] Junghans, Levy, *Intellectual Property Management*, 25.

[214] As the plan would not be considering the economic benefits, primarily, of using the PCT process.

patent applications for fast moving markets and a delayed application (under the PCT) for other economies will benefit from the two alternatives.[215]

The second variable is claim breadth, and a patent applicant can use it at will. The scope of the protection, that is, the technological area covered by the claims is one of the factors that influence the usefulness of the patent right, basically by hampering the competition and raising its economic value.

It is in the best interest of the applicant to file as broad a claim as possible. The advantages are clear: it confers optimal protection against forthcoming technology, excluding the competition from the market and raising the value of the patent in the events of licensing or selling it. However, patents with excessive claim breadth could increase the likelihood of encountering opposition from the competition. Besides, broader claims could prove challenging when it comes to pass an inventive step examination in patent offices. These issues could raise uncertainty and potential litigation, with the risk of delayed procedures and higher costs.[216] In any event, the technical area covered in the claims should be sufficient, ideally, to cover the needs of protection for the applicant's business.[217]

Costs

When balancing the decision of maintaining one or another specific patent strategy, businesses should compare the potential benefits, still unclear, with the costs involved, which are usually more straightforward.

By the time a business considers to integrate a portfolio of patents from their innovation, there are costs that most certainly will be faced, both direct to the patent process and indirect. The direct costs will be the patent attorney and office fees, in the first place. And, of course, if the invention is deemed to be marketed, one should be aware of the indirect costs

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[215] In the same sense, and having presented the strategies for delaying the granting of a patent, one could think whether it is better to file a patent relatively late. The simplest answer, however, is that it could prove wrong: early filing is essential not to incur in pre-empting, by a competitor or the ever-growing state of the art.

[216] Which could also be used as a weapon against the competition, in case this one has lesser financial capability. It would be important to know the size of the competition, as it has been previously discussed.

[217] Junghans, Levy, *Intellectual Property Management*, 33.

related to this effect, such as management time, prototyping, marketing and business development.[218]

This cost model should be based mainly in the applicant's approach to risk and budget; therefore, it will be different depending on the capabilities of the different types of agent discussed in this section. Specially complicated is the situation of an individual inventor or start-up, who not only has to balance benefits with costs, but be concerned with the cash position through the process. Maintaining a positive reserve of capital during patent drafting and application, possible negotiation of licenses and, why not, prosecution of patent infringers is particularly difficult for these small agents. That is the case of unsupported inventors, who typically abandon applications relatively early in the process,[219] mostly as a consequence of an unrealistic commercial expectation and lack of capital.[220]

But there are also other types of costs that should be of concern to every type of player. As it has been discussed in section **2.4.2**, patent litigation is an extremely expensive activity, both in terms of time and money, either when defending the validity of a patent in court or suing an infringer. It is by comparing the certainty of these costs with the plausibility and scale of revenue that a business should value their strategy towards achieving an ideal patent portfolio.

3.5.2 Patent portfolio valuation

As has been already remarked earlier, immaterial assets, such as patents, are of strategic importance in the overall value of businesses. However, some questions arise while analyzing this fact: how can a company calculate the value of a patent? Is there an internationally accepted method to do so? Before these questions are addressed, it is worthy to note how the need for patent valuation has gradually increased to become such an important and urgent issue. Patents need to be valued for their use in a broad set of

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[218] Junghans, Levy, *Intellectual Property Management*, 36

[219] Which, ironically, is when the invention is deemed patentable but the cost of transferring to national offices is overwhelming

[220] The development phase that exists between funding R&D and applying for a patent, and actual revenues from the commercialized product, is called 'Valley of death.' It is particularly damaging to small companies, universities and individuals, as it has been stated.

transactions: first, when determining where to apply for a patent and whether to renew an active patent right; over time, businesses have been interested in calculate value of patents while negotiating over licensing fees and analyzing patent portfolios of competitors; in recent years, the exploitation of patents as financial assets to secure investing and bank loans has finally deemed valuation essential for businesses. This evolution is illustrated in the annex M.

In practice, there are many methods for valuing patents and, more generally, all IP. It is difficult to provide a quantitative evaluation of a patent right, not just because of the options present, but also because the value may vary significantly depending on, for instance, who owns the technology.[221] The principal evaluating methods of IP are: cost, income and market approach,[222] presented in Annex N.

All three methods have their advantages and disadvantages, and the most suitable one must be chosen on a case-by-case basis.

Typical indicators of the value of a patent are the number of forward citations, that is, references to the patent made in latter documents that indicate its scientific importance.[223] Other indicators of patent value are: the patent family relationship; lifespan of the patent; whether oppositions were filed and its outcome; and the number and quality of the claims.[224] All in all, the internal use of patent valuation is only half of the story. International agreements such as Basel II and IFRS[225] require businesses to account for their IP.

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[221] Fröhling, Werner, "Practical experiences regarding the evaluation of medium-sized patent portfolios," *OECD Conference on Intellectual Property Valuation and Exploitation* (Berlin: June 30, 2005), 10–12.

[222] However, during the process of documenting for the present study, no less than six other different valuating methods were found, most of them, on biased and commercially-scoped papers. It is clear that there is not just one solution to the problem.

[223] However, it is not a method without flaws: it still needs to be resolved how to calculate the potential value of a recently granted patent—with no forward citations—in a point of time when valuation is important.

[224] EPO, *Portfolio management and patent valuation,* 2010, http://www.epo.org/searching/essentials/business/valuation.html (accessed April 20, 2011).

[225] Basel II and the *International Financial Reporting Standards* are recommendations on banking laws and regulations issued by the Basel Committee on Banking. EPO, *Scenarios for the Future*, 39.

Valuation of their patent portfolios is not only an interesting matter for businesses when they have to account for their intangible assets, it is also a required issue according to international adequacy agreements. But, for starters, this accounting is not even governed by standards, and by far patent systems' uncertainty—as it is always possible to challenge granted patents—will require to re-evaluate patent portfolios constantly to keep in track with technology pace of change. In my opinion, there has not been sufficient rationalization of such matter, and there is too much subjectivity in IP accounting valuation to be considered unbiased. Admittedly, the EPO specifically has a system of patent and IP valuation—IPscore—,[226] but its use is not worldwide spread, in any case.

And it is not a small issue. In 1999, some authors[227] noted that a massive potential upside for businesses started with the valuation and licensing of their IP, and accounted for an interesting amount of immaterial asset wealth unaccounted and unexploited.

Undervaluation of patent portfolios implies a lower potential income for business, but the dangers of overvaluation of patents and IP are still unknown.

3.5.3 Business use for patent information

The different benefits of patents for protecting inventions, secure a market share and provide an economic value for a business have already been discussed. It remains to be seen what are the benefits a company or inventor could obtain by using *others'* patents. Indeed, patents are a source of information about innovation in different fields, which is one of the characteristics of the patent system.

And information in patents can also be incorporated into the strategy of businesses in different angles: recent technological developments, competitors' activity and market prospection are useful resources that can be obtained.[228]

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[226] The IPscore is a program for valuation of IP portfolios based on different indicators which was developed by the Danish Patent Office. EPO, *Portfolio management and patent valuation.*

[227] Rivette, Kevin G., Kline, David, *Rembrandts in the Attic: Unlocking the Hidden Value of Patents* (Cambridge: Harvard Business School Press, 2000).

[228] EPO, *Business use of patent information*, http://www.epo.org/searching/essentials/business.html (accessed April 20, 2011).

Traditionally, patent information has always been related to technology searches, with an interest in finding out already-existing solutions to solve a technical problem. Today, it could also serve as an indicator of future developments in technology. Interested in gaining some advantage in the technological race, agents could use patent information to recognize signals at an early stage, which will enable optimization of their research activities. At the same time, developing an overview of the market from patent information is essential to locate trends and assign R&D budgets accordingly. In the same way, it is important to check that there is no infringement of a thirds' patent scope of protection when developing or marketing a new product or service.

Patent information is useful to determine the capabilities of companies. It is possible to obtain information about competitors' activities often long before the corresponding products reach the market, to determine if they are addressed to new technical areas and what is their international coverage. And it is also possible to find potential licensing or cooperation partners in the same manner.

There are many reasons for companies to use the available patent information to help decision-making in the events of researching new products. Whereas large companies are aware of the benefits of searching patent literature, it has been reported[229] that SMEs are underusing this virtually-free information source.

Henceforth

Patents can encourage innovation and economic growth under certain conditions and hamper it under others. The impact of patents on innovation and markets is very complex, and a fine-tuned patent system is crucial in the overall economy.

In the ICT market, traditional barriers to entry are becoming transient: capital is cheap; labor is mobile; first-mover advantage is rapidly outdated; brand is ephemeral. Companies are realizing that among the few remaining barriers to entry the market are patents.[230]

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[229] Keupp, *et al*., *SME-IP 2nd Report*, 13

[230] *The Economist*, "Patent Wars," April 6, 2000.

4 TECHNOLOGY DRIVERS & THE PATENT SYSTEM

The pace of technological advance is increasing at an accelerating rate. As complexity increases and the newest technologies converge and integrate with each other, so it does the potential number of innovative processes. Can the patent system adapt to this ever-changing nature?

4.1 THE COLLABORATIVE APPROACH

The romantic image of the inventor experimenting in his or her basement, and eventually developing a new technology,[231] does not reflect the process of modern implementing of inventions. Today, processes of innovation have replaced the 'flash of genius' from nineteenth-century inventors, for a highly cumulative,[232] sequential[233] and complementary[234] process.

Together with this cumulative process, the fact that the different types of technology converge permits an increased complexity of the final products, with a larger number of interconnected innovative components. These complex products are less likely to be developed in a sole organization, but from the effort of technology networks, in which corporations are largely related by their patents and other IP. However, is the protection conferred by patent systems as useful in this type of interconnected setting as it was in typical stand-alone innovation? Due to increased patenting, the ownership of knowledge in technical fields is increasingly fragmented, therefore impeding practical diffusion and access, and thus threatening the ideal concept of 'standing in the shoulders of giants.'[235]

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[231] An inspiring image which was referred to in Ghafele, Roya, *Of war and peace: analysing the international discourse on intellectual property law*, Intellectual Property Quarterly (London: Sweet & Maxwell, 2010), Issue 3: 240.

[232] Murray, Fiona, O'Mahony, Siobhan, *Reconceptualizing the Institutional Foundations of Cumulative Innovation*, (Princeton: University of Princeton, 2005), 3.

[233] Bessen, James, Maskin, Eric, *Sequential Innovation, Patents and Imitation* (Cambridge: MIT, 1999), 20.

[234] In the sense that different research lines are selected by the different innovative agents, *ibid*.

[235] EPO, *Scenarios for the Future*, 29.

And yet, key factors for future technological development such as integration, interoperability[236] and standardization could be hampered by this 'patent mosaic.'[237] Integration and interoperability are critical for the developing of ICT products, either if they work as peripherals, or share the same interfaces, protocols and languages. The boundaries between the technologies of these products are becoming blurred, and it is therefore crucial to address the issue of fragmenting ownership of technology.[238]

Technical development increases, as the diffusion of new technology also accelerates.[239] This acceleration not only makes new technical products available anywhere in the world at virtually the same time, it also shortens the overall market life of these products, as new gadgets are being constantly developed.

It is precisely at this moment of technology fast obsolescence and clogged patent system that national patent offices are confronting a challenge that may change the way they work, presented in **Figure** 2. Multidisciplinary technologies and an overall increased rate of patenting are leading to difficulties when it comes to examine these highly complex applications that require both a high level of knowledge and quite some amount of time.

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[236] Principal interoperability in the ICT industry is provided in Annex H.

[237] 'Patent mosaic' designates the fact that a high number of patent holders own part of a technology niche. The term has been taken from a report by Schacht, Wendy H, *Patent Reform: Issues in the Biomedical and Software Industries*, Congressional Research Service report for US Congress, RL33367 (2006), 11.

[238] Frain, Tim, *Patents in Standards & Interoperatibility* (2006), 3.

[239] I.e., it took 50 years for the telephone to be adopted by ¼ of the US population. Mobile phones achieved the same result in only 7 years. EPO, *Scenarios for the future*, 26.

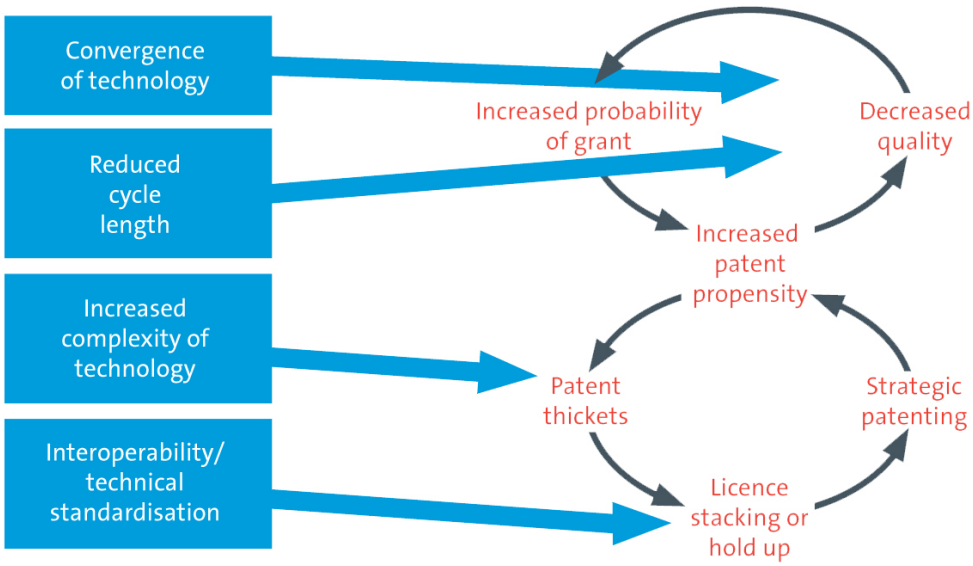

Figure **2** – Issues in technical scenarios

Source: EPO, *Scenarios for the Future*

4.2 PATENT THICKETS

The results of convergence of technology and cumulative innovation processes can be seen in highly complex products from the ICT field such as smart-phones or tablets. Each one of them can contain hundreds (or thousands) of patented developments in the overall sum of their components and the tools required for their fabrication.

The commercialization of such a complex product requires that *every* patent holder grant permission to the use of his or her protected component or process.[240] In order to prevent any possible infraction lawsuit, a producer may need hundreds of licenses to bring one

[240] If a patent holder chooses to do so, he or she can simply deny any other party the right to use their idea.

product to the market[241] at a high risk: if one of the patent right holders refuses to license their technology, it may impede the product to reach the market.[242]

The scenario where a great number of patents converge around a single technology product is called a 'patent thicket,' and is one of the most important challenges in the sectors of semiconductors, computing science and telecommunications.[243] Fragmentation of IPRs among a plurality of agents in such cumulative innovation systems prevent further innovation based on former contributions; and can also hamper the diffusion of novel technologies to society.[244]

Rarely a sole company will hold all the patents involved in the production of a single high-tech product. So, the combination of multiple patents around a single innovative product could lead to 'hold-up' situations, and royalty stacking.[245] This situation encourages companies to further apply for patents in search of a stronger portfolio, and using this portfolio as a negotiation tool or, in extreme cases, as a counter-threating weapon. Patents are no longer to win exclusive rights over a new technology, but for their value as strategic tools—defensively, to ward off infringement suits, or offensively as a means of blocking competitors' products.

This increasing propensity to patent creates even more dense thickets, in a vicious circle that is aggravated by the inherent problems of the already-backlogged patent systems. The growing number of applications does not necessarily imply a rise in innovation; in fact,

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[241] I.e., production of a smart-phone could suppose the payment of royalties for 200–300 patents, about 15–20% of the final selling price. *The Economist*, "The great patent battle."

[242] This situation could be proven worse if the product already being mass produced, or already being commercialized, is the objective of an injunction—a legal halt of the production or commercialization.

[243] Which are in fact the sectors that concern this study.

[244] The phenomenon of patent thickets is also referred to as the 'Tragedy of the anti-commons' in the literature. As an opposite to the 'Tragedy of the commons,' describing the problem of the overuse of free valuable resources by all individuals involved. The opposite—the 'Tragedy of the Anti-Commons'—, concerns about the problem of too many people owning parts of a valuable resource. A possible outcome, then, is the blocking of the resource by intern veto. Loosely based in Heller, J., *The Gridlock Economy: How Too Much Ownership Wrecks Markets, Stops Innovation, and Costs Lives* (New York: Basic Books, 2008); cited in Surowiecki, James, "The Permission Problem," *The New Yorker*, August 11, 2008.

[245] 'License stacking' or 'royalty stacking' is the adverse situation caused by the existence of a high number of patents relating to a particular technology, which requires the payment of license fees to many patent owners.

backlogs could result in an increased probability of patent grants, which could, in turn, lead to lesser-quality patents[246] and, as a result, to a growing number of patent thickets. In any case, it seems difficult that a situation of zero-sum game could imply a rise on innovation.

In technologies in which dense patent thickets define the landscape of manufacture and development, different strategies can be developed by the concerned organizations willing to skirt the thicket, or simply gain an economic advantage. Enterprises interested in the utilization of other parties' IPRs could make use of cross-licensing[247] and patent pools, which is a similar concept but not so much spread.

4.3 PATENT POOLS

In order to skirt the possibility of patent infringement lawsuits in situations of high density and division of ownership of patent rights, manufacturers could arrange a *patent pool.* Namely, a patent pool is an agreement between different patent holders to *pool* a package with all patents related to a given technology, and to offer licensing of this package for a fixed fee, to those owners and any third parties. These agreements are reached to overcome the problems resulting of patent thickets, while still maintaining innovation incentives related to IPRs. Pools also help reduce license transaction costs, distribute risks between the members and provide better exchange of information, as some authors have pointed it out.[248] Recent technologies and standards[249] are examples of these arrangements.

Although pools are useful in these technological patent-dense areas, the idea of a *pool* is not new. It was introduced in the US airplane industry in the late 1910s,[250] followed by others in

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[246] An undesired effect already discussed in section **3.3**.

[247] Cross-licensing is an agreement between two parties, consisting on the mutual granting of licenses. The concept is discussed in section **2.5.4**.

[248] Clark, Jeanne, *Patent Pools: a Solution to the Problem of Access in Biotechnology Patents?* (USPTO, 2000), 6.

[249] Examples of recent patent pools are the DVD and the W-CDMA standard for 3G.

[250] The Manufacturer's Aircraft Association was crucial to the U.S. government because the two major patent holders, the Wright Company and the Curtiss Company, had effectively blocked the building of any new airplanes, which were desperately needed as the United States was entering World War I. Jeanne Clark, *Patent Pools*, 4.

the radio and television frequency standardization.[251] The concept has vastly proliferated in the last 20 years, when the industry has found it handy for the development of technical standards or protocols for new technologies.

The management of patent pools is a complicated task. What was before an act of solely private agreement between the organizations involved with one of them administrating the pool, nowadays the model is slightly different with businesses specialized in pools' administration. In fact, three different models coexist today:

Conjoint license. The patent right holders designate an intern administrator for the licensing of the IPR package; this is the traditional method, i.e., Philips in DVD3.

External administration. Corporations specialized in patent pools administration take the initiative of pool formation. They are also the agents for licensing, charging royalties and arranging the distribution of revenues. Examples of this type are MPEG LA and ViaLicensing.

Patent platform. They appeared in order to solve specific problems of highly complex technologies. Here, an independent organization values the different IPRs, preceding a latter bilateral negotiation between parties. The main purpose of this type of system is to standardize the process of forming a pool, and increase 'transparency' and 'cleanness,' with regard to the principal antitrust regulation bodies. One of the current examples is the 3G Patent Platform Partnership, or 3G3P.

That being said, the principal use of patent pools in the ITC field is the setting of standards. Technical standards appear for the sake of homogeneity and interoperability and are meant to result in a public good. However, because of the standard nature of wide sharing, they are susceptible of being affected by patent blocking. Standard setting has problems similar to those affecting patent thickets, but is somewhat more strongly affected by 'hold-up' situations—as it is more difficult to 'invent around' once the standard is set.[252]

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[251] Further information on the history of patent pools at *Ibid*.

[252] Examples of patent disrupting standard setting are SDRAM (Synchronous Dynamic Access Memory), which was amended by Rambus, one of the former members of the organization, and UMTS standard, which infringed

The convenience of patent pools has been widely discussed. Patent pools strike directly at the problem governing patent thickets, as some authors have pointed out.[253] Resuming the concept of the 'Tragedy of the Anti-Commons,'[254] the more technological innovations' property is divided into small IPRs, the more difficult it will be to manufacture new products based on that technology. Along these lines, some claim that the limitation of intellectual property rights seems necessary to the effectiveness of these same rights.[255] Likewise, underuse of innovative resources created by excessive ownership does not have visible effects—mainly, inventions which will not get made.[256]

On the contrary, some claim that patent pools do not correct all the existing problems in situations of royalty stacking, as the 'outsider problem'[257] still affects pools—the members can abandon it when they consider there is a better business for their IPR.[258] Not only that, but cooperation between horizontal competitors is viewed with suspicion by antitrust authorities.[259] Private agreements like patent pools may reduce the possibility of being sued by members, but could increase litigation for hampering free competency, antitrust or antimonopoly practice.

Qualcomm patents. There are numerous standards with 'better luck,' as GSM and UMTS; JPEG, GIF and MPEG; DVD and HTTP.

[253] Bessen, James, *Patent Thickets: Strategic Patenting of Complex Technologies* (Research on Innovation, 2002), 19.

[254] See note **244**.

[255] Heller, *The Gridlock Economy*; cited in Surowiecki, *The Permission Problem*.

[256] Surowiecki, *The Permission Problem.*

[257] Bessen, *Patent Thickets: Strategic Patenting of Complex Technologies*, 20.

[258] "When something you own is necessary to the success of a venture, even if its contribution is small, you will tend to ask for an amount close to the full value of the venture," reads one of the conclusions of the study by Vanneste, S., Depoorter, B., *Putting Humpty Dumpty Back Together: Pricing in Anticommons Property Arrangements* (Washington: George Mason University School of Law, 2004), 25.

[259] *The Economist*, "Patently Absurd?"

4.4 PATENT 'TROLLS' [260]

Business dependence in IP, and patents in particular, has been increasing in the last thirty years.[261] The fact that the value of this immaterial property is intensifying has ease the way for the appearance of new players in the exploitation of patent rights. This new type of businesses relies basically on licensing or selling ownership of their patents, which are obtained by their work on R&D.[262]

But the most controversial of this new type of businesses are Patent Licensing and Enforcement Companies—PLECs, derogatorily called 'trolls.'[263] PLECs are based on patent rights as leverage for license and infringement claims, without producing themselves. These patent rights are either filings of patent application for inventions—in the hope they may have a base for litigation with a third-party that would use the invention later on—[264] or are acquisitions of patents to be used with the same objective as before.[265] Patent 'trolling' is essentially done in markets where the cost of litigation is too high, and companies therefore prefer to settle.[266]

But it is in complex technical fields where patent 'trolls' obtain more lucrative results: integration and interoperability make patent blocking an easy task. Whole industries and a large number of companies could be infringing a core element of technology. Likewise, because of technological complexity, companies could increase their chances of inadvertent

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[260] A patent 'troll' takes its name from the mythological creature depicted as an ugly monster, which lives under a bridge and asks for a toll when hikers cross.

[261] As seen in section **3.5**.

[262] I.e., universities and individual inventors, but also less-known 'technology development companies,' such as *Intellectual Ventures*. More information on the latter type could be obtained in Gladwell, Malcolm, "In the air: Who says big ideas are rare?" *The New Yorker*, May 12, 2008.

[263] The term is widely used in the field.

[264] The case concerning BlackBerry email system, confronting RIM v NTC (which was finally settled off-court) is an example of this case. Surowiecki, James, "BlackBerry Picking," *The New Yorker*, December 26, 2005.

[265] "The term "troll" is more likely to be applied to someone who generates 'paper-invention' patents or buys up patents, and then, with little regard for their valid scope, asserts that those directly active in the marketplace should pay royalties for continuing to do what they are already doing, or else stop their operations." ICC, *Current and emerging intellectual property issues for business*, 23.

[266] For this same reason, the patentee-favorable US courts (after the formation of CAFTA in 1982), made 'trolling' a commoner issue in the States.

infringement. 'Trolls' are deemed more damaging for ICT companies because normal proceedings on patent blocking are not useful anymore: enterprises cannot use their patent portfolio in cross-licensing arrangements or counter-infringement claims to force settlements—'trolls' are not interested in manufacture.[267]

The question of 'trolls' is thus important to the ICT field and its relation with the patent system, and some measures must be taken. First, the system needs to be rigorous in the way patent are granted—avoiding too obvious, too broad, or well-established ideas.[268] In the same sense as described in section **3.3**, questionable patents are a significant concern and can harm innovation. Also, in order to reduce the power patent 'trolls' have to halt production and manufacture in infringement cases, a weakening of the injunction figure—in cases where the patent owner has no intention to manufacture—has also been proposed.[269]

But it is necessary to point out that these countermeasures are not exempt of problems: these changes could be damaging to innovation processes, as universities and private inventors without means to commercialize are *technically* 'trolls,' after all.

In spite of their shortcomings, patent 'trolls' have become part of the patent system, yielding quite a lucrative business in the technological market.

4.5 'RESEARCH EXEMPTION' AND RESEARCH TOOLS

As often remarked previously, patent owners are granted the right to prevent third parties from using, making or selling their invention for a limited time. However, most European national patent laws apply certain exceptions of infringement to this right: essentially, to

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[267] Reitzig, Markus, *et al.*, *On Shark, Trolls, and Their Patent Prey: 'Being Infringed' as a Normatively Induced Innovation Exploitation Strategy* (2006), 27.

[268] Likely, 'trolling' is not as usual in Europe as it is in the US: in the latter, 99% of patent applications are approved. In Surowiecki, *BlackBerry Picking*.

[269] Injunction weakening for public interest was actually proposed in the case *eBay Inc v. MercExchange, L.L.C.*, 547 U.S. 388 (2006), on the 'direct-buy' and 'buy it now' features. Also discussed in Reitzig, *On Shark, Trolls, and Their Patent Prey*, 23.

private acts without commercial scope and experimental purposes on the matter patented.[270] The latter of the two exceptions—freedom to experiment on the patented matter—is commonly referred to as 'research exemption,' thus providing with a framework of further innovative development using patent disclosure.

Indeed, it is important to find a balance between legal certainty of patent rights and the promotion of research in the matter protected. A strong research base is crucial to the competitiveness of national economies, and to achieve a full application of the social principle of increasing innovation behind the patent system. As such, the exception only extends to experiments addressed to generating genuinely new information,[271] and should have a direct connection with the subject matter of the invention.

Given a close interpretation of the law, only the experimentation *on* a patent product is susceptible to be exempted of infringement of a patent right. Experimentation *with* a patent product is not exempted. According to the law, patented research tools are therefore not comprised in the 'research exemption,' and would entail a patent infringement whenever applied, even in experimental labor.[272]

Having presented the legal precepts governing the issue of experimenting with patented tools, it seems essential to point out that these precepts governing research tools affect investigation in the fields concerned negatively. Specifically in bioengineering and genetics, where a patent over a DNA sequence as a research tool is particularly adverse[273] since in this

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[270] See section **2.4.2**. Also, it is generally exempted the use of patented matter on foreign ships and aircrafts crossing national waters or airspace as well as manufacture of pharmaceutical products, in preparation for a patented product becoming generic—also called 'Bolar' provision.

[271] The 'research exemption' does not extend, then, to experiments designed to simply verify existing knowledge.

[272] According to the British case of *Smith, Kline and French v Evans Medical* (1989, FSR 513)—Not exemption: "A contrary conclusion would, in practice, deprive the words 'relating to the subject-matter of the invention' of any meaning as [the article referring to the 'research exemption'] would apply in all cases where experiments were carried out which involve the use of an invention."

[273] This is the case of BRCA1 and BRCA2—two breast cancer genes patented by Myriad Genetics in 1998—, which provided debate on this issue, due to excessive restrictive licensing. They are currently in the hotspot: in 2009 these two patents were challenged by the American Civil Liberties Union (ACLU). At *CNN*, "ACLU sues over patents on breast cancer genes," May 12, 2009, http://edition.cnn.com/2009/HEALTH/05/12/us.genes.lawsuit/index.html (accessed April 26, 2011).

field it is almost impossible to 'invent around.' Although certain scientific authorities have questioned patents on research tools in certain areas,[274] no consensus has yet been achieved.

To sum up, it is safe to say that the patentability of research tools is a sensible matter affecting to the capacity to foster further innovation within the scientific community by reducing the available tools, at least the public ones. A more conclusive assessment of this issue seems particularly elusive.

4.6 SINGULAR CASES OF PROTECTION

From traditional inventions on mechanical products or processes, patents have been granted to protect chemical products, biotechnological inventions, software and nanotechnology. This broadening of the scope of patent protection is basically due to economic interests in pursuing of protection of new matters of protection.[275]

This increased number of patentable matter is responsible for the appearance of new patenting issues, expressly related to the new subjects such as 'living material,' software patents, etc. Solutions to these problems have been addressed in essentially two ways: by a broadening of the interpretation to accommodate the new patentable matter,[276] or by the creation of new types of rights.[277]

4.6.1 Biotechnology

Being one of the fastest growing fields of technology of the last decades,[278] biotechnology has today an extraordinary impact on health, agriculture and the environment. Biotechnology

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[274] In this case, the British Royal Society: *Keeping science open: the effects of intellectual property policy on the conduct of science*, (London: The Royal Society, 2003); and the *Summary Report of the CSIC/OECD/OEPM Conference on the Research use of Patented Inventions* (Madrid: May 18–19th 2006), 12, where it was reported that "Firms seldom abandon a research project after having discovered the existence of a patent on a research tool."

[275] Hilty, Reto, "Pressures on a unitary system," *Policy options for the European patent system* (Brussels, 2006), 38.

[276] I.e., software protection in the USPTO and JPO.

[277] As the International Convention for the Protection of New Varieties of Plants (Paris, 1961).

[278] Yet, precedential cases of biotechnological patents go back as far as the mid-nineteenth century. In 1843, a method for producing yeast cultures was patented. And in 1873, chemist Louis Pasteur patented another yeast-making method.

covers a wide range of areas, from medical applications to agriculture, genes and microorganisms. Considering the critical importance of this technology and the powerful market it provides, debate has generated about the convenience of biotechnologies patenting, both in the industry and the general public.

But the public is more concerned about the potential risks and ethical implications of biotechnological applications, in particular GMOs, human embryonic stem cells or cloning, than in purely patentability issues. In any event, critical opinions on patents in the biotechnology field are not only concerned with ethical implications *per se*,[279] they also point at the inconvenience of an exclusivity right over innovations in such essential areas. In the same sense, some authors and even researchers[280] point out that gene production should not be considered an invention, but a discovery, instead, and therefore not subject to patentability. On the other hand, economic studies[281] have repeatedly shown that some important innovation would have never reached the market without patents.

This ongoing debate is related with the everlasting conflict of the principles driving the patent system (as it has been stressed enough during the study), that is, the compromise between the need to protect the public good, while reckoning the rights of patent owners and the contribution of patents to foster innovation. In the case of biotechnology, however, the matter affected by this regulation are critical elements related to social wellness such as food and health, what should doubtless provide a different parallax on the problem.[282]

In Europe, patentability of biotechnical inventions is judged by applying the basic requirements,[283] but in the particular of biotechnology-related inventions secondary legislation applies, mainly because of the debate on the matter just mentioned. So, the

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[279] And indeed essential ethical implications exist in some cases, i.e., the 'Edinburgh patent' of 1999, covering animal embryonic stem cells—as 'animal' could be interpreted as including humans—; and the 'Oncomouse,' patented in 1988, a mouse genetically designed to suffer cancer to aid studies of the disease.

[280] According to Martin Khor, the Nobel-Prize winner John Sutton presented the case in a WIPO seminar while drawing the map of the human genome: "These are naturally occurring genes, you can't patent them because they are naturally occurring. I discovered it, but I did not invent it." EPO, *Interviews for the Future*, 492.

[281] *Ibid*.

[282] At least, political, economic and scientific decision-making is affected.

[283] Which were presented in section **2.3**.

European law permits the patentability of inventions related to biotechnology, with the exceptions of methods of diagnostic, treatment, surgery or therapy of humans and animals, plant and animal varieties, and biological processes for plant or animal production.[284] In the US, applicants may patent genes and parts of genes, though genetic sequences (ESTs) are not patentable.[285]

Also, it should be remembered that because of the especially sensible matter involved, some inventions in the field of biotechnology are susceptible to be considered contrary to the 'public order' or morality.[286] Human cloning and exploitation of human embryos are two examples. In any case, these issues are open to debate, and ethical implications of these technologies could be further discussed.

4.6.2 Software

Computers are present in almost every area of modern life, from the most complex technical tasks to simple human interaction. Due to their extended use, an increasing number of new inventions related with computers are filed at the national patent offices. While the US and Japan patent offices grant patents for software; in Europe applicants need to prove that their inventions implemented in a computer constitutes a technical improvement. In the EPO nomenclature, software and other computer-related inventions are referred to as Computer-Implemented Inventions or CIIs.[287]

Therefore, in Europe, software programs are not patentable 'as such.'[288] During the 90s, software programs were indeed considered mental acts performed by programmers, and therefore were not considered as inventions.[289] Exclusion was afterwards revised at the end

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[284] Arts. 52 and 53.b EPC

[285] According to the USPTO *Gene Patent Guidelines*.

[286] Art. 53a EPC

[287] As defined by the EPO, a CII is an "invention that works by using a computer, a computer network or other programmable apparatus."

[288] The phrasing changes in the different national laws, but the fact remains the same: i.e., in the UK and Spain, software 'as such,' or *per se* is not eligible.

[289] See, for example, decisions of the EPO's Boards of Appeal, cases T 833/91, T 204/93 and T 769/92 (OJ 1995, 525).

of the decade[290] and, today, CIIs are not excluded as long as the programs applying for a patent cause a further technical effect—that is, beyond the inherent interaction between program (software) and computer (hardware). In that sense, technical control operations implemented by a computer method are also patentable at the EPO.[291]

It must be said that CIIs and software are not *a priori* excluded in all their forms; nonetheless they are still referred to as non-patentable in the EPC art 52(2). Whether patents should be granted to software inventions in all cases, never, or only in the special circumstances considered by the EPO is an ongoing debate.[292]

In the US, on the contrary, software patents have been granted for thirty years; ever since the (in)famous "everything made under the sun by man is patentable" was coined in 1980.[293] The Australian patent office also provides protection to software-related inventions that conform to a 'useful economic or commercial result.'[294] Japan also grants patents for software, with a doctrine closer to the EPO—patents for a 'very advance creation.'

To understand the current patent policy on software in the USPTO, one should understand that protection of software programs has always been a pressing matter for the bigger ICT development companies in the United States.[295] Overseas, programs' protection in European countries has usually been granted using copyright,[296] following the Berne Convention of

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[290] In the decision T 1173/97 (OJ 1999, 609), largely based on article 27.1 TRIPS.

[291] In T 6/83 (OJ 1990, 5), the board found that an invention "relating to the co-ordination and control of the internal communication between programs and data files held at different processors in a data processing system having a plurality of interconnected data processors in a telecommunications network, the features of which were not concerned with the nature of the data and the way in which a particular application program operated on them, was to be regarded as solving a problem which was essentially technical." *Case Law of the Boards of Appeal* of the EPO, 24.

[292] With regard to the jurisprudence of France (*Schlumberger* case, 1981), Germany (*Seitenpuffer* case, 1991), and EPO cases (Viacom, 1996; IBM 1997), which were contrary to an exclusion of computer programs from patentability.

[293] Case *Diamond v Chakrabarty*, 1980, 447 US 303.

[294] IP Australia Patent Guidelines.

[295] Bain, Malcolm, *et al*., *Propietat Industrial*, (Barcelona: UOC, 2008), 44.

[296] Along with other reasons already discussed, copyright is for a company not as interesting as patents because ownership is granted to the author who is normally an employee. Licensing is also easier through patents. It could prove useful to review issues about inventions' ownership. See section **2.5**.

1971. In that way, certain limits to the copy of code were set, but limits to reverse engineering where still quite blurred (it is still possible to imitate the ideas with different instructions of code). The algorithm—which is both the most creative and important part of the software program—is therefore not sufficiently protected for the requirements of the software industry. The interest of the big ICT companies on software patenting is precisely the protection of the algorithm or the idea behind the code. In that way, third parties could be stopped from producing a program using different instructions yet based on the same idea, thus solving the problem of copyright-protected programs. In any case, patents provide stronger rights, more difficult to confront and therefore more valuable. On the other hand, patents are quite expensive processes, in terms of time and money, and the products and processes protected may not have a lifespan long enough for the patent to be considered useful.

Debate on the field of software patenting is partly centered on the fact that the publication of the source code is not compulsory, nor is the publication of patents' application or grant.[297] In my opinion, this reserve of know-how, which is kept secret by the applicant, diminishes the legal certainty of third parties, although, I am aware that there is no legal basis to request it.[298]

But patentability of computer programs is not only a problem of legal uncertainty and cross-licensing game for agents in the ICT industry; it is also a challenge for patent offices. Examination processes are even more complicated, as the search of previous 'state of the art' related to a particular software application could prove a boundless purpose, due to the lack of fully disclosure and the fast pace of changes. Despite the rapid growth of patents for CIIs in Europe and the US, the proportion of this type of patents on the overall number of patents is still small. Businesses rely mainly on first-timer advantage, secrecy and copyright to protect their software products and investments, not on patents.[299]

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[297] EPO, *Patents for Software? European Law and Practice*, (Munich: EPO, 2009), 12.

[298] *Ibid*.

[299] Ghosh, Rishab Aiyer, "Software patents, economic evidence and competition," *Open Forum on the Substantive Patent Law Treaty* (Geneva: WIPO, 2006).

The principal opposition against patents for computer programs comes from the Open Source movement, which provides ground to a complementary market for established software monopolies and licenses, based on free distribution of products using a special form of copyright contract. OS is, in fact, an alternative system to patenting software, as shown in Annex O.

4.6.3 Business methods

Business methods are plans, rules or processes for carrying out activities of economic, financial or commercial character. In Europe, they are not eligible for patentability *per se*,[300] only when, as a process, the business method provides a solution to a technical problem—which is a basic requirement for the granting of any patent according to the EPC.

In the US, on the contrary, methods for doing business were deemed patentable following the *State Street Bank* decision in 1998; which aroused a boom of patenting of not only business methods, but also internet-based business methods. This latter type secured a high number of allegedly 'obvious' patents,[301] as Amazon's *one-click*.[302]

4.6.4 Integrated circuits

Under this label it is made reference to the circuits made from semiconductor materials, which are the core elements of electronic industry. These integrated circuits are realizations of a particular circuit that solves a technical problem, but are not patentable by themselves. The inherent characteristics of integrated circuits—they are only getting smaller and complex—[303] makes designing them costly; in fact, the investing required raises inversely proportional related to their size. But, on the other hand, copying and producing an integrated circuit is a relatively easy task—raw material and manufacturing are pretty cheap.

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[300] Methods for doing business are not considered inventions by the articles 52.2.c EPC, see also section **2.3.4**.

[301] Other examples of 'lucky winners' are: USPTO patent no. 5,862,223 "Selling professional advice over the internet," and no. 5,797,127 "Reverse auctions, where the buyer sets the price," both by Jay Walker *et al.*, from Walker Asset Management. Appearing in *The Economist*, "Patent Wars."

[302] In Europe, Amazon's *one-click* was also filed, granted and amended, before being finally rejected.

[303] Almost 50 years ago, Gordon Moore coined his law for development in chip technology: he predicted doubling of the capacity and halving of the cost every 12–18 months.

Hence, protection was needed for topographies, this special type of 'designs.' This protection was introduced in the mid-80s in the principal IP offices.[304] The protection of a semiconductor topography includes the schematics of the circuit configuration or tri-dimensional disposition, where the elements and components of the circuit are integrated in a semiconductor substrate—the chip or semiconductor plaque. The reproduction and commercial exploitation of the protected topography are granted to the right holders for ten years, beginning at the end of the year when the topography is first registered or exploited. The products protected in this way are usually marked with a T inside a circle.

It should be noted that, similarly to other inventions, layout designs of semiconductors are notably developed by employees of corporations. The related issues pointing at authorship and ownership of semiconductor topographies are analogous to inventions, already discussed in section **2.5.3**.

4.6.5 Nanotechnology

Being one of the expected key technologies of this century, this growing field of technology is relevant to almost any area of engineering and science. And it is exactly the interdisciplinarity and complexity of nanotechnology that creates a new challenge to the patent system.

According to the EPO definition, "the term nanotechnology covers entities with a controlled geometrical size of at least one functional component below 100 nm in one or more dimensions susceptible of making physical, chemical or biological effects available which are intrinsic to that size." In a nutshell, nanotechnology provides a technical effect[305] in a nanometrical scale.

But this definition involves a new dilemma: whether a known effect or apparatus being downscaled complies with the requirements of patentability, specifically, novelty and

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[304] In particular, the US Semiconductor Chip Protection Act of 1984; Japanese Act on the Circuit Layout of a Semiconductor Integrated Circuits of 1985; and European Directive on the Legal Protection of Semiconductor Products of 1986.

[305] Biotechnology; information processing, storage and transmission; materials and surface science; interacting, sensing and actuating; optics and magnetics, etc.

inventiveness. In general, a smaller version of a device is not novel in itself; patent applications need to meet additional criteria to be considered patentable. And the same is true for inventiveness: does miniaturization involve an inventive step? Following the EPO application guidance[306] in this case, if the solution provided by the invention is the enhancing of a technical effect in a selected sub-range, the device could be considered new. In order to be inventive, the technical advantage provided by the invention should not be found in the prior technical art, and it should not be an obvious effect for a skilled person to arrive at.

Finally, these criteria should be complemented by a greater need of 'sufficient disclosure' at the patent application of a nano-device: the highly sophisticated methods for manipulation at those scales could go well beyond the knowledge of a skilled person in the field—or even beyond the knowledge of an expert. Sufficient information on the performing of the invention should be provided, specifically detailed information about the processes and tools used.[307]

4.7 'ONE-SIZE-FITS-ALL'

Besides the relatively little legal differentiation presented in the previous examples of singular cases of patents—which is mostly concerned with the suitability of a particular matter to be patentable or not—there is hardly any differentiation in the degree of protection granted between different kinds of technology.

This generalization of protection by patent systems—the 'one-size-fits-all' approach—may not be satisfactory at all. As pointed out before, patent systems are facing difficult challenges in particular complex technology fields; as an example, ICT-related industries are negatively affected by patent thickets and blocked standardization. Many voices in the industry claim for "shorter" and "faster to obtain" exclusive rights for complex technology patents and

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[306] EPO, *Nanotechnology and patents* (Munich: EPO, 2009), 10–13.

[307] However, it is also true that by means of disclosure of methods and tools used, particular know-how of the research company could be exposed in such a way.

business methods;[308] whereas pharmacological industries are quite happy with the protection granted by patents. Indeed, a twenty-year-patent protection seems ludicrous in ICT areas, with an expected lifespan of the products of less than 3 years.[309]

One of the principles behind patent systems justification is to provide an appropriate market framework for justifying the disclosure of an invention, and obtaining an economic benefit. But not every field of technology obtains the same benefits from the system: while 1–2 patents cover a typical pharmacological product; a complex technical product could be protected by 100–1000 patents.[310] The first instance comes close to an ideal monopoly for a pharmacological product; the second to hardly an incentive at all.

And there are even further differences. The possibility of potential blockage is higher in complex technical fields, where a product is covered by a large number of patents; in discrete innovative industries, it is negligible.[311] Innovation in the fields of biotechnology and pharmacology is relatively more expensive[312] when compared to ICT and software technologies. Consequently, not all kind of innovations obtains the same economic benefits from a granted patent, and whether they deserve an identical degree of protection requires separate consideration.

The 'one-size-fits-all' approach is notably sustained in the contents of the TRIPS agreement, particularly in article 27.1, which determines that the conditions of protection are the same for any type of technology,[313] and article 33, which defines the minimum temporal patent protection—20 years. However, the text of the agreement leaves some freedom to apply limitations to patent rights in certain areas, taken into account the legitimate interests of third

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[308] For example, Amazon's CEO Jeff Bezos and Tim O'Reilly, editor of manuals on open-source software. *The Economist*, "Patent Wars."

[309] Michael Blakeney. At EPO, *Interviews for the Future*, 31.

[310] Shinjiro Ono. At EPO, *Interviews for the Future*, 252.

[311] *Complexity* of a product defines the number of patents covering the final product, being *discrete* a product covered by a little number of patents, and *complex* one product being affected by a large number.

[312] Typical costs of developing a pharmacological product and bringing it to the market could be on the order of €100million. Shinjiro Ono, at EPO, *Interviews for the Future*, 252.

[313] Where it is stipulated that, apart from the exceptions included in arts. 27.2–3, "patents shall be available and patent rights enjoyable without discrimination as to . . . the field of technology . . . ." (art. 27.1 TRIPS).

parties.[314] In fact, as some authors have already pointed out, these limitations do not need to be identical in all fields of technology, since the economic and socio-political impacts of the different fields may vary.[315] From which follows that patent systems may be susceptible of amends in different technologies in a non-conflicting fashion with the TRIPS agreement.

Over- and under-protection are the two undesired consequences of the current approach of 'one-size-fits-all.' Possible solutions to these problems relate to a 'split' in patent granting between protective oriented patents,[316] for mainly discrete innovation; and defensive patents,[317] more closely related to cumulative innovation. In this sense, some experts have been arguing on the convenience of maintaining a strong patent protection in areas such as the pharmaceutical industry, but establishing a compulsory license framework—license of rights regime—[318] in the case of ICTs, whose final objective would be creating an injunction-free industry-wide virtual partnership.[319] Whereas it is still debatable if this measures could prove determining in diminishing the problems related to 'hold-up' situations in these fields, it is undeniable that patent rights are weakening, and that change is inevitable.

Henceforth

Absolute ownership right over a patented invention grants a patent holder to deny any other party the right to use his/her idea—for as long as the patent is valid. In particular fields of technology—where a high number of patents covering a complex product—that simple fact is deemed to be the cause of issues with patent thickets and the blocking of technical standards, providing leverage to PLECs and reducing access to research tools. The 'one-size-fits-all' approach is weakening patent protection in the ICT field.

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[314] Art.30 TRIPS, which is also the legal base for compulsory licensing of generic pharmaceutical products in public health crisis, together with art. 31.b.

[315] Hilty, *Pressures on a unitary system*, 39.

[316] Protection-oriented patents are more interested in securing the return of the investment, i.e., pharmacological and biotechnological.

[317] Corporations made use of defensive patenting to basically gain freedom to operate, with typical sectors of this approach being ICT and software.

[318] Frain, *Patents in Standards & Interoperatibility*, 4.

[319] Reichman, Jerome H., "Of Green Tulips and Legal Kudzu: Repackaging Rights in Subpatentable Innovation," *Vanderbilt Law Review* 53 (2000), 1777.

5 CONCLUSIONS AND FURTHER WORK

5.1 CONCLUSIONS

- From the point of view of innovative agents, the principal problem of the patent system is the uncertainty in the rights conferred by patents, due to lack of harmonization among national patent offices and the overall diminishing quality of patents granted. This uncertainty is responsible for unbalanced situations and higher costs on litigation. Some of the suggested solutions are: convergence of processes in the principal patent offices, stricter examining processes and introduction of opposition systems before and after granting. The objective is to grant the applicants fair protection for their inventions, while guaranteeing the legal certainty of third parties whose activities are affected by the patent.

- The model of the patent system works on the assumption that the production of one innovative product corresponds to just one patent. In the ICT industry, because of its distinctive features, ownership over patents covering a product is shared (forming overlaps or 'patent thickets'). Patent overlapping increases the probability of blocking parties and lowers revenues—the incentives to innovate. Patent pools, standardization, cross-licensing and compulsory licensing are measures proposed by certain ICT industries, but are related to other problems, mainly anticompetitive practice.

- 'One-size-fits-all' (applying the same patent approach to all technologies) is no longer feasible for maintaining an equal level of innovation incentive in the different technical fields. In the ICT market, patents confer lesser incentives in certain high-complex technologies compared to other fields, and also diminish lead-time advantage due to the pendency of the granting patent process. All in all, patent system may have disrupting effects on complex technology-related markets, so further regulation and/or patent system alternatives may be needed.

5.2 FURTHER WORK

These are some proposals of further study on the issue that may be implemented:

- To completely characterize the ICT-field relationship with the patent system, it is necessary to further analyze the special case of software. The relation of software with patents (in the US and Japan) and copyright (Europe) require an approach inherently different to hardware. Likewise, the relation with proprietary software and Open Source software is lacking—practically—in a physical context.

- From investigation and analysis to application. It is necessary to study the legal amends and regulative measures that may be done in ICT-related law—not conflicting with the international and European legal framework—to achieve the objectives proposed.

APPENDIX

A. ISSUES AFFECTING THE PATENT SYSTEM

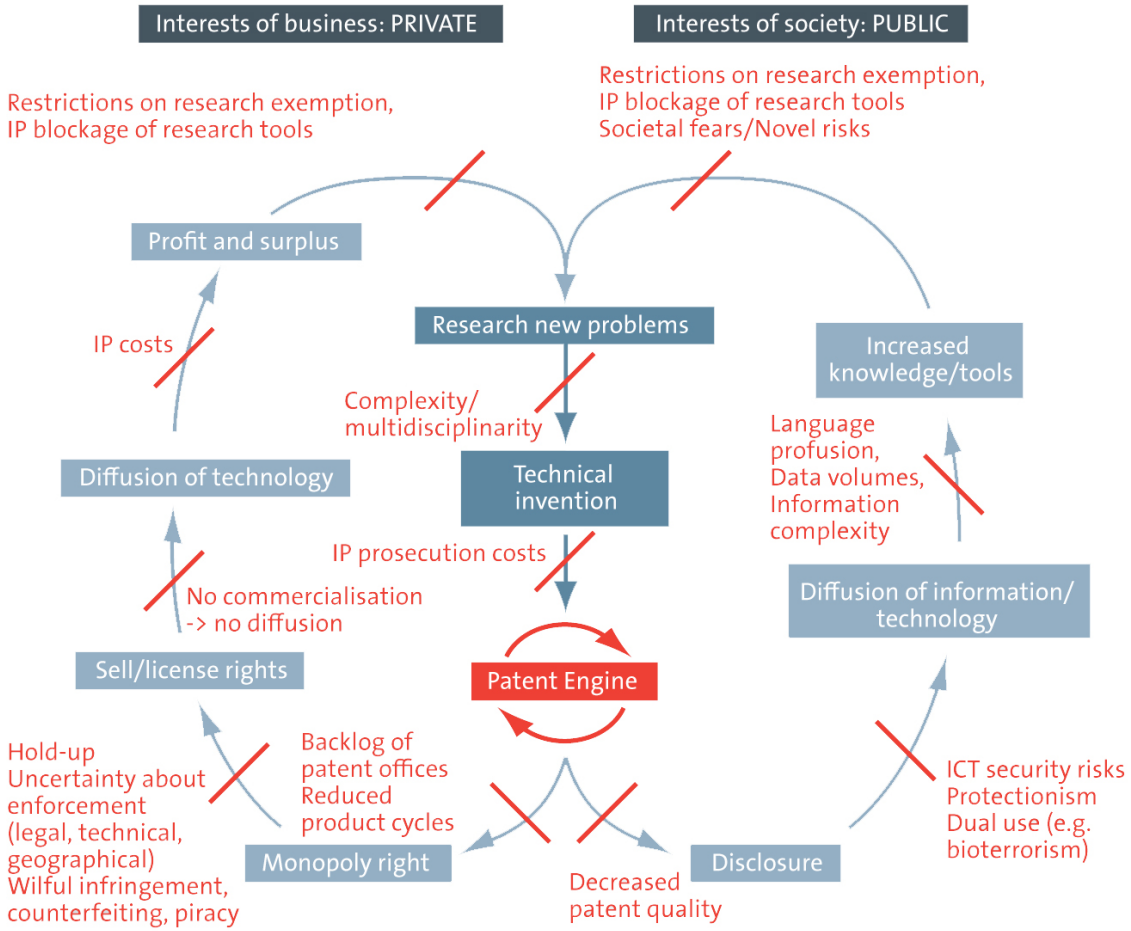


Figure **3** – Challenges for the patent system

Source: EPO, *Scenarios for the Future*

B. DETAIL OF A EUROPEAN PATENT

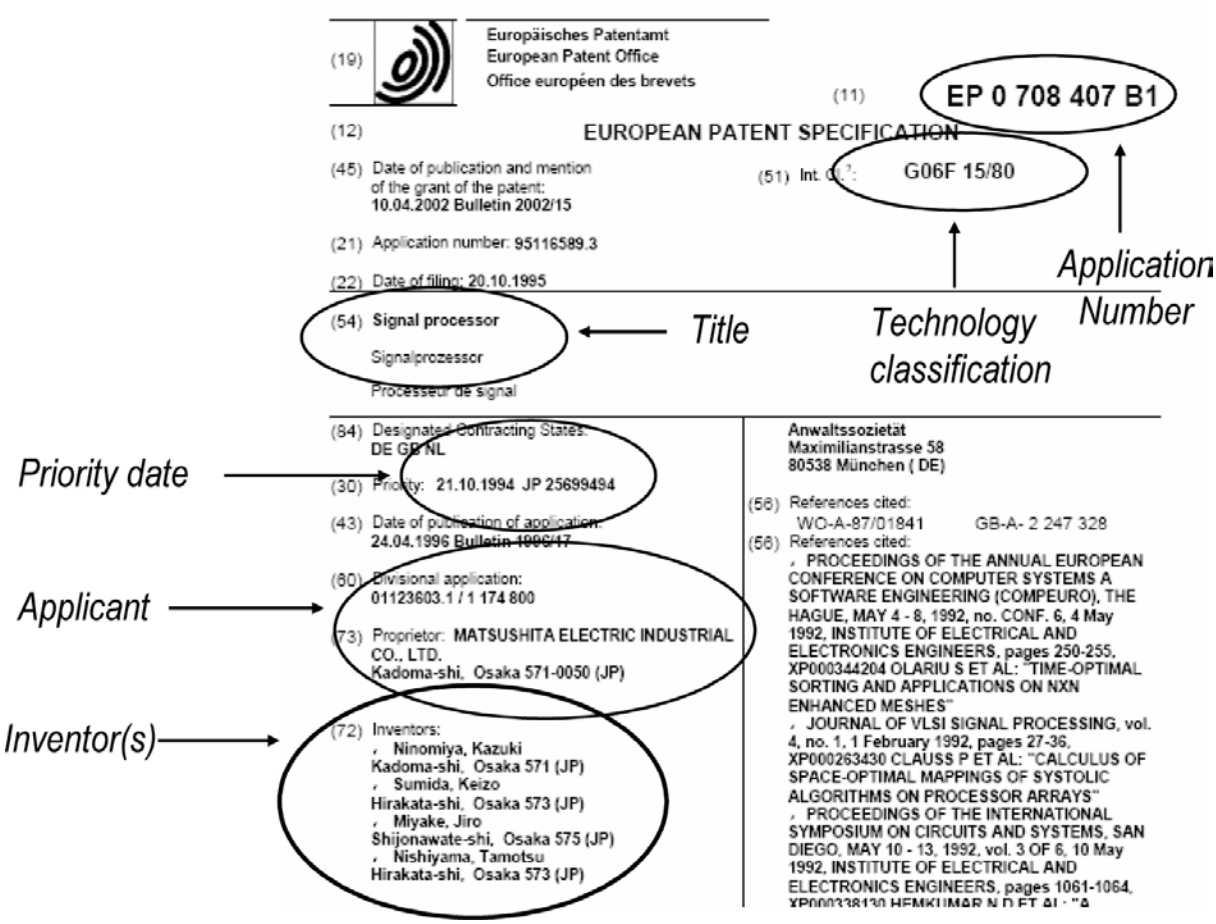
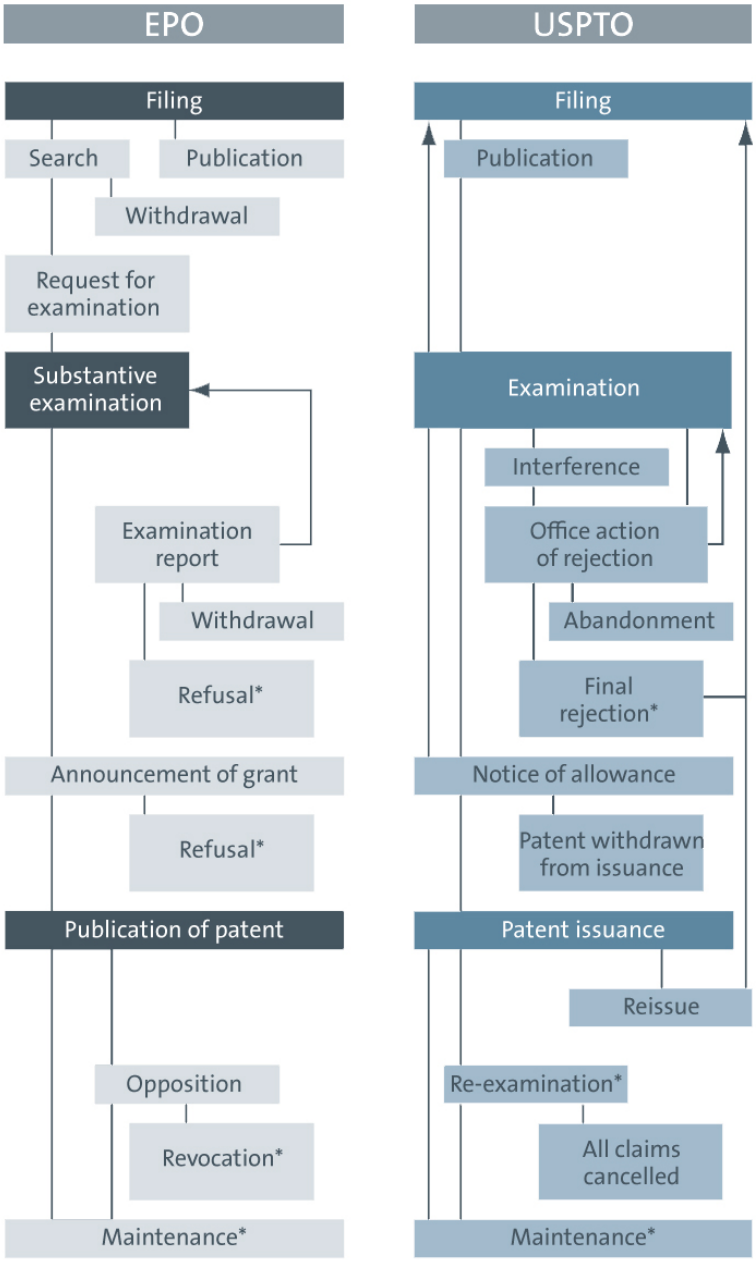


Figure **4** – Detail of a European patent file

Source: Dachs, *et al., Europe's strengths and weaknesses in IST*

C. GRANTING PROCESSES AT EPO&USPTO



* May be appealed

Figure **5** – Patent granting processes in the EPO&USPTO

Source: EPO, USPTO & JPO, *Trilateral Statistical Report2005*

D. THE PCT PROCESS

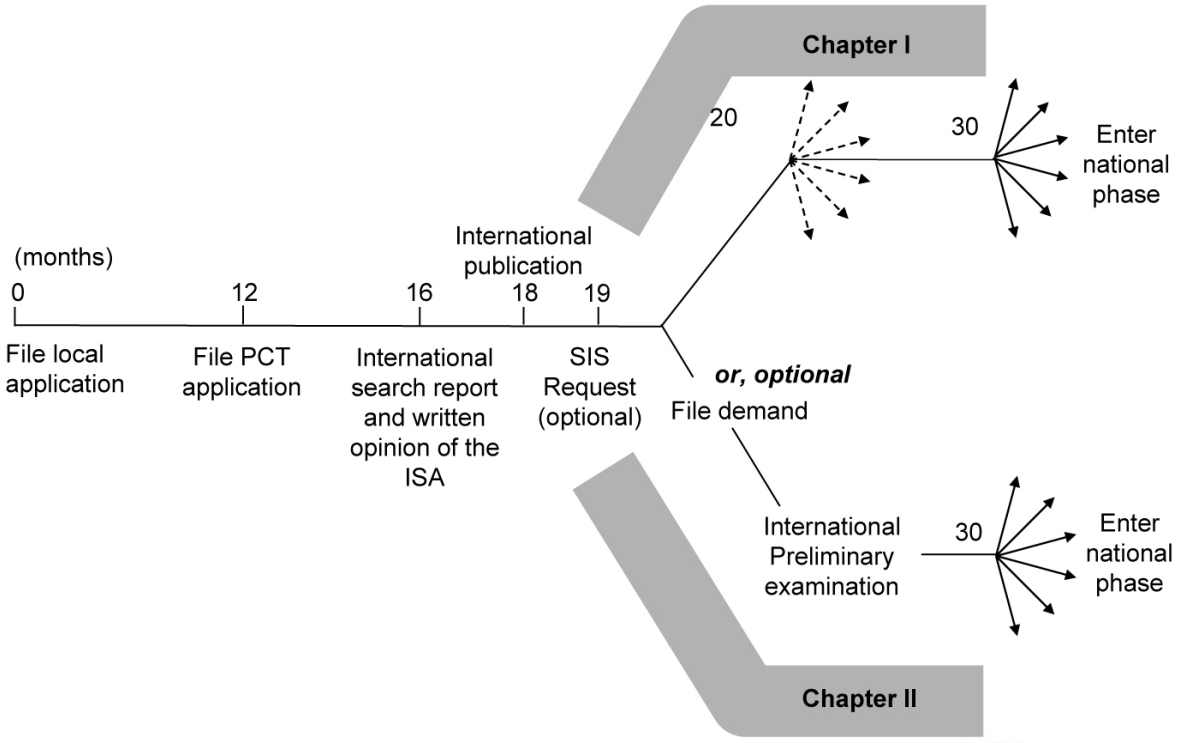


Figure **6** – Patent granting process under the PCT

Source: WIPO, *Seminar Presentation of the PCT*

E. CONTRACTING STATES

European Patent Convention (EPC) contracting states (May 2011)

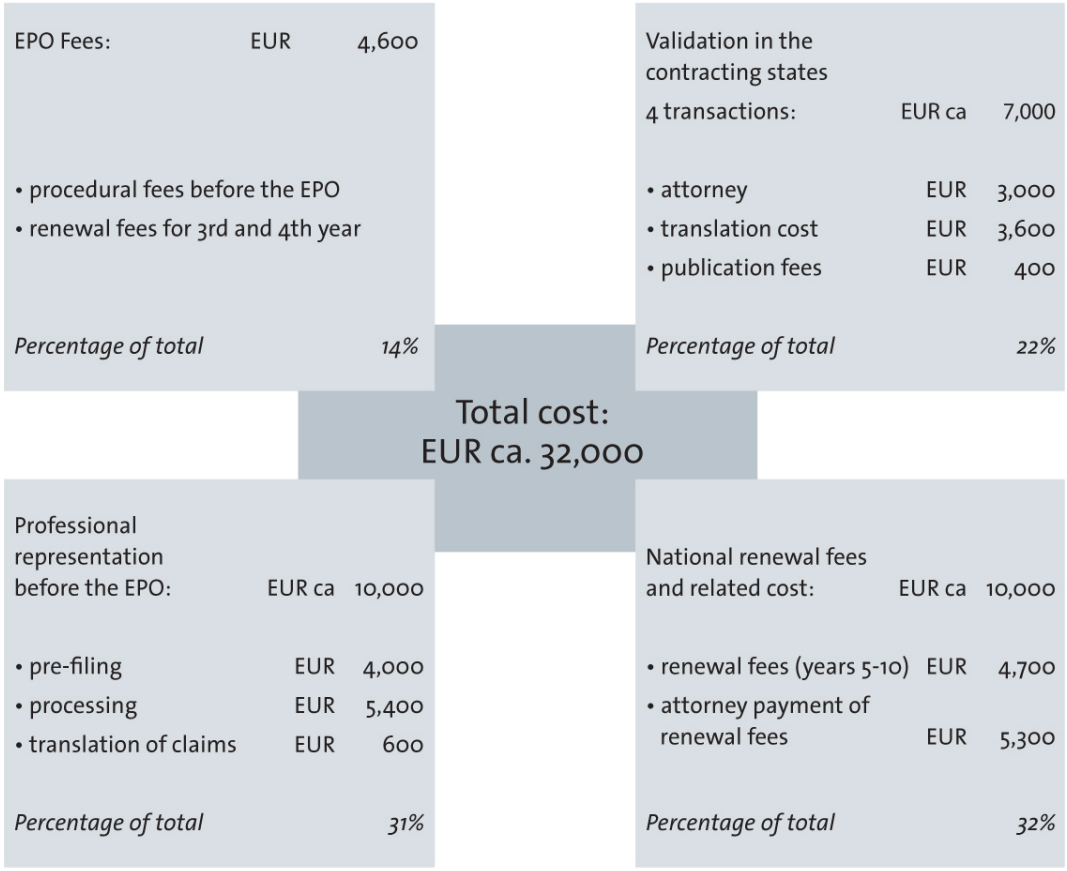
Albania
Austria
Belgium
Bulgaria
Cyprus
Croatia
Czech Republic
Denmark
Estonia
Finland
The former Yugoslav Republic of Macedonia
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Liechtenstein
Lithuania
Luxembourg
Malta
Monaco
Netherlands
Norway
Poland
Portugal
Romania
San Marino
Slovakia
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
Bosnia and Herzegovina*
Montenegro*
Serbia*

*extended states

Patent Cooperation Treaty (PCT) contracting states (May 2011)

United Arab Emirates
Antigua and Barbuda
Albania
Armenia
Angola
Austria
Australia
Azerbaijan
Bosnia and Herzegovina
Barbados
Belgium
Burkina Faso
Bulgaria
Bahrain
Benin
Brazil
Botswana
Belarus
Belize
Canada
Central African Republic
Congo
Switzerland
Côte d'Ivoire
Chile
Cameroon
China
Colombia
Costa Rica
Cuba
Cyprus
Czech Republic
Germany
Denmark
Dominica
Dominican Republic
Algeria
Ecuador
Estonia
Egypt
Spain
Finland
France
Gabon
United Kingdom
Grenada
Georgia
Ghana
Gambia
Guinea
Equatorial Guinea
Greece
Guatemala
Guinea-Bissau
Honduras
Croatia
Hungary
Indonesia
Ireland
Israel
India
Iceland
Italy
Japan
Kenya
Kyrgyzstan
Comoros
Saint Kitts and Nevis
Democratic People's Republic of Korea
Republic of Korea
Kazakhstan
Lao People's Democratic Republic
Saint Lucia
Liechtenstein
Sri Lanka
Liberia
Lesotho
Lithuania
Luxembourg
Latvia
Libyan Arab Jamahiriya
Morocco
Monaco
Republic of Moldova
Montenegro
Madagascar
The former Yugoslav Republic of Macedonia
Mali
Mongolia
Mauritania
Malta
Malawi
Mexico
Malaysia
Mozambique
Namibia
Niger
Nigeria
Nicaragua
Netherlands
Norway
New Zealand
Oman
Peru
Papua New Guinea
Philippines
Poland
Portugal
Romania
Serbia
Russian Federation
Seychelles
Sudan
Sweden
Singapore
Slovenia
Slovakia
Sierra Leone
San Marino
Senegal
Sao Tome and Principe
El Salvador
Syrian Arab Republic
Swaziland
Chad
Togo
Thailand
Tajikistan
Turkmenistan
Tunisia
Turkey
Trinidad and Tobago
United Republic of Tanzania
Ukraine
Uganda
United States of America
Uzbekistan
Saint Vincent and the Grenadines
Viet Nam
South Africa
Zambia
Zimbabwe

F. COST OF A SAMPLE EUROPEAN PATENT



* 18 pages, 6 states, 10-year term. Excl. in-house preparation costs for the patent applicant. All values rounded

Figure **7** – Cost of a sample European patent

Source: EPO, USPTO *&* JPO, *Trilateral Statistical Report2005*

G. TECHNOLOGIES AND NEED OF VARIETY

	PHARMA	BIOTECHNOLOGY	COMPUTER HARDWARE AND SEMICONDUCTORS	SOFTWARE
Innovation type	mainly discrete	discrete and cumulative	cumulative	cumulative
Number of patents per product (complexity)	few	medium, high for research tools	high	high
Importance of interoperability	negligible	negligible	high	high
Blockage potential of patents	negligible	negligible, except for research tools	high	high
Innovation costs	very high	very high	medium	low
Product cycle	long	short-long	short	short
Patent use	protective (return of investment)	protective (return on investment) + attract capital	defensive (freedom to operate)	defensive (freedom to operate)
Major alternatives IP approaches	none	none	trade secrets	copyright and open source

Table **1 –** How technology is demanding variety from patenting

Source: EPO, *Scenarios for the Future*

H. INTEROPERABILITY IN THE ICT FIELD

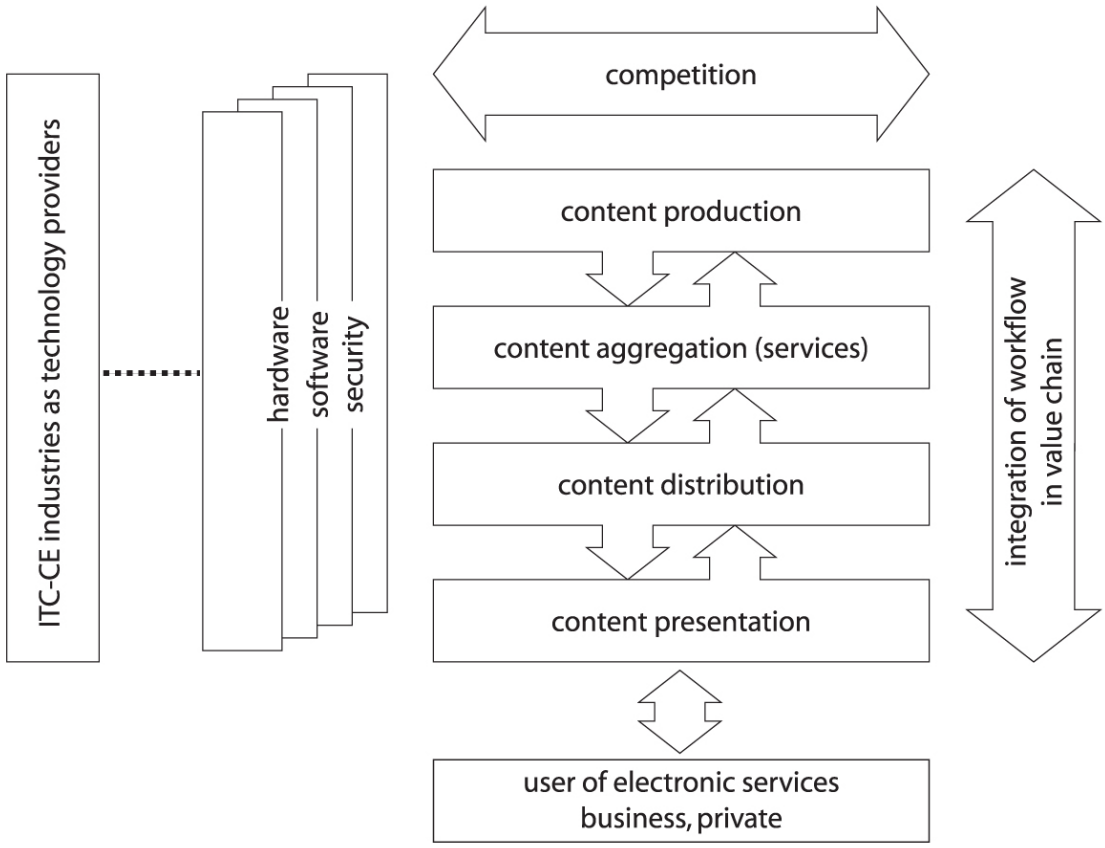


Figure **8** – Essential interoperability in the ICT field

Source: EICTA, *Interoperability White Paper*

I. CLASSIFICATION OF ICTS

1. Electronic elements and devices[320]
    a. *Passive elements*
    b. *Semiconductors*
    c. *Screens and display devices*
    d. *Electro-acoustic elements*
    e. *Radiofrequency tubes and elements*
    f. *Antennas*
    g. *Cables*
    h. *Interconnection elements*
    i. *Batteries*
    j. *Other electronic elements and devices*

2. Manufacturing processes outsourced
    a. *Plaques and subsets*
    b. *Equipment*
    c. *Other manufacturing processes outsourced*

3. Consumer electronics equipment
    a. *Digital and analog support*
    b. *Wireless terminals and devices*
    c. *PCs and components*
    d. *Peripherals*
    e. *Access equipment to communications networks*
    f. *Audio Equipment*
    g. *Video equipment*
    h. *TV-receiving equipment*
    i. *Digital Photography*
    j. *Game consoles and electronic-entertainment equipment*

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[320] From AETIC, *Análisis y propuestas de delimitación del sector de la electrónica y las tecnologías de la información y las telecomunicaciones* (Madrid: Ministerio de Industria, Turismo y Comercio, 2005), 15–17 (my translation).

   k. *Equipment location and orientation*
   l. *Other consumer electronic equipment*

4. Professional electronics
   a. *Instrumentation and measurement*
   b. *Electronics for defense, detection and navigation*
   c. *Electronics for physical security*
   d. *Electro-medicine and bioengineering*
   e. *Industrial electronics*
   f. *Automotive electronics*
   g. *Equipment and systems for audiovisual production and transmission*
   h. *Power systems*

5. Telecommunications equipment
   a. *Access networks equipment and systems*
   b. *Transport networks equipment and systems*
   c. *Core network equipment and systems*
   d. *Terminals and switchboards*
   e. *Software platforms for applications and services*
   f. *Basic services and engineering*

6. Information technology systems industries
   a. *Manufacture of information technology equipment*
   b. *Office equipment*
   c. *Software*
   d. *Computer Services*
   e. *Telematics services*
   f. *Consumables*

7. Audiovisual and telecommunications services provision
   a. *Fixed communications*
   b. *Mobile Communications*
   c. *Internet access*
   d. *Audiovisual*
   e. *Satellite*

   f. *Phone information and user guides*

8. Services associated with information technology and communications sector
   a. *Consulting and advice*
   b. *Certification*
   c. *Training*
   d. *Customer service*
   e. *Other services related to ICTs*

9. Content Production
   a. *Phonographic*
   b. *Film and television production*
   c. *Video game production*
   d. *Editorial content Production*
   e. *Content Editing and packaging*

J. PATENT APPLICATIONS BY FIELD OF TECHNOLOGY

Field of Technology	Year of Filing			Growth Rate,
	2003	2005	2007	2003-07 (%)
Electrical engineering				
Electrical machinery, apparatus, energy	85,482	106,304	120,547	9.0
Audio-visual technology	70,228	88,558	83,210	4.3
Telecommunications	69,603	88,285	92,168	7.3
Digital communication	43,955	52,393	63,537	9.6
Basic communication processes	16,794	18,149	19,106	3.3
Computer technology	95,794	125,860	145,282	11.0
IT methods for management	17,361	18,755	25,900	10.5
Semiconductors	64,945	79,676	88,349	8.0
Instruments				
Optics	67,217	82,144	81,770	5.0
Measurement	57,460	67,078	78,595	8.1
Analysis of biological materials	11,267	10,137	10,558	-1.6
Control	25,821	28,880	32,321	5.8
Medical technology	65,063	68,832	80,678	5.5
Chemistry				
Organic fine chemistry	46,449	50,941	51,364	2.5
Biotechnology	35,992	31,657	33,930	-1.5
Pharmaceuticals	57,302	67,801	69,638	5.0
Macromolecular chemistry, polymers	26,215	27,582	28,840	2.4
Food chemistry	21,669	22,652	28,421	7.0
Basic materials chemistry	34,474	37,816	42,191	5.2
Materials, metallurgy	27,619	30,168	36,089	6.9
Surface technology, coating	25,760	30,229	33,980	7.2
Micro-structural and nano-technology	1,839	2,242	2,617	9.2
Chemical engineering	31,929	33,618	37,130	3.8
Environmental technology	20,411	22,195	25,584	5.8
Mechanical engineering				
Handling	42,435	46,083	48,179	3.2
Machine tools	35,652	38,827	43,729	5.2
Engines, pumps, turbines	40,965	43,668	51,926	6.1
Textile and paper machines	38,295	40,581	37,946	-0.2
Other special machines	46,759	47,171	50,607	2.0
Thermal processes and apparatus	23,969	26,698	29,969	5.7
Mechanical elements	43,123	46,525	53,063	5.3
Transport	66,267	71,612	79,659	4.7
Other fields				
Furniture, games	42,920	47,414	53,663	5.7
Other consumer goods	32,362	35,385	36,391	3.0
Civil engineering	53,240	56,434	62,844	4.2

Table **2** – Total patent applications by field of technology(2003–2007)

Source: WIPO, *World Intellectual Property Indicators 2010*

K. BUSINESS MOTIVATIONS FOR PATENTING

Businesses seek patent protection for a variety of reasons. Here is a list of typical reasons:[321]

- **Commercial exploitation**
    - Building monopoly position
- **Preventing lawsuits**
- **Licensing**
    - Generating license income
    - Building a base for infringements claims
- **Cross-licensing**
    - Getting a seat in the table when standards are being set
- **Prevention from imitation**
    - Provisional protection of an innovation by having pending applications
- **Blocking competition**
    - Blocking others from entering a market
- **Reputation**
    - Creating marketing messages and becoming more visible in the market
- **Communicating innovativeness to investors**
- **Performance**
    - Measuring the performance of the company or individuals
- **Financing**
    - Assembling a portfolio of rights to create financial strength

[321] Built from Graham, Sichelman, *Why Do Start-Ups Patent?*, 2–6; and EPO, *Scenarios for the future*, 35.

L. OTHER IP RIGHTS AND PROTECTION MEASURES

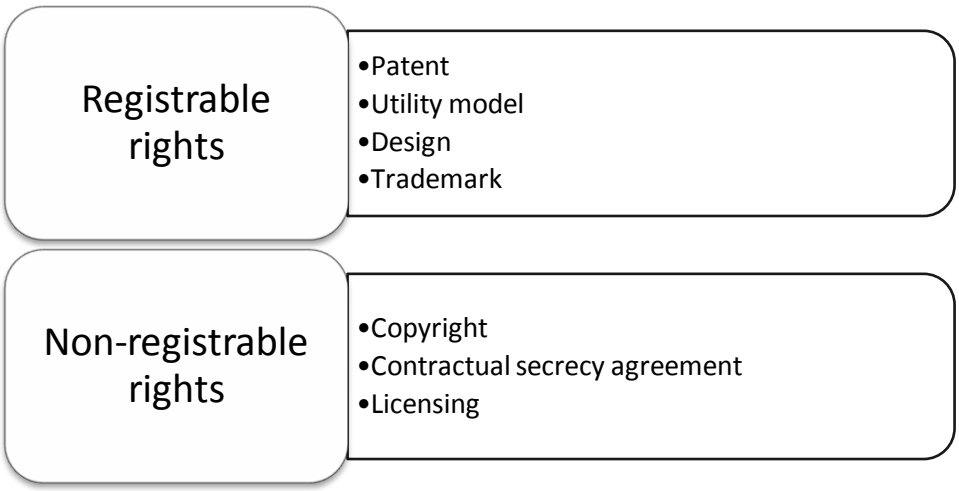

Figure **9** – IP rights and other alternatives measures of protection

Source: Friesike, *et al., SME-IP 3rd Report*

M.IP EXPLOITATION AND VALUATION – EVOLUTION

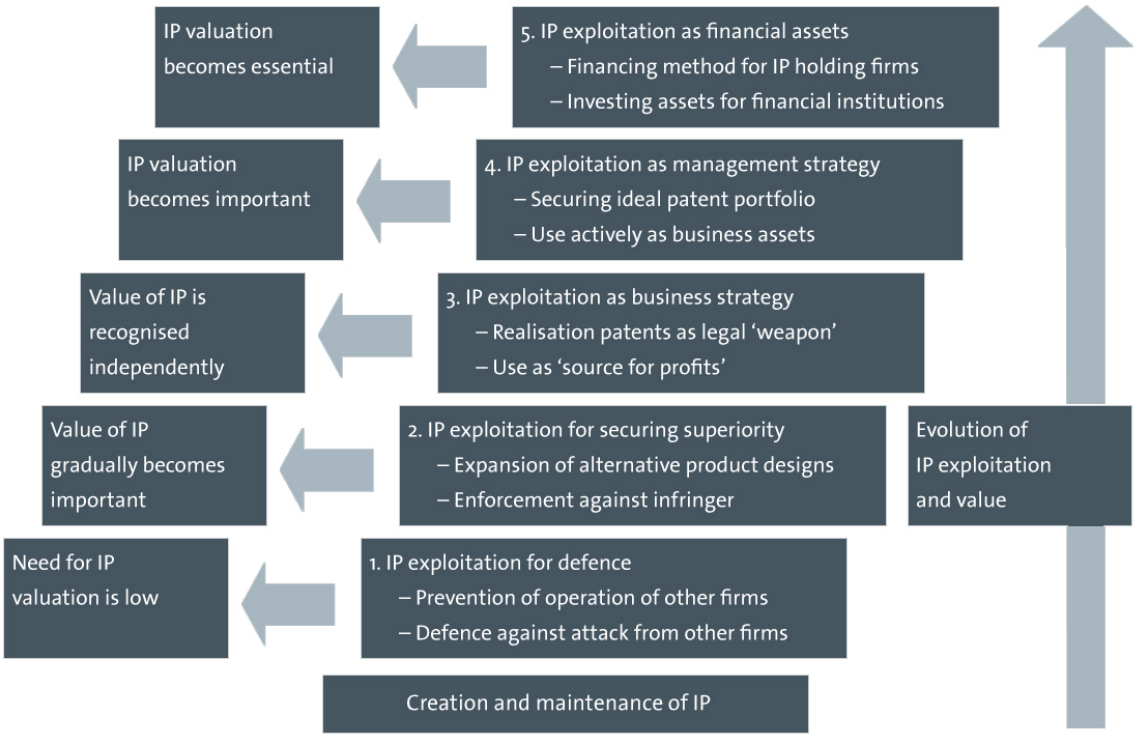

Figure **10** – Evolution of IP exploitation and valuation demand

Source: OECD, *Valuation and Exploitation of Intellectual Property*

N. IP EXPLOITATION AND VALUATION – METHODS

	BASIS	CONCEPT	METHOD	SUITABLE FOR	WEAKNESS
Cost approach	"The investment costs for the technology"	Reproduction/replacement costs	Reimbursement of costs	New (emerging or innovative) technologies	Not correlated with future value of the asset
Income approach	"A reliable business plan"	Expected income of the investment	Discounted cash-flow (net present value)	Technologies ready for commercial exploitation	Subjective valuation of future cash flow relies on accurate analysis
Market approach	"Equal assets shall have equal price"	Comparison with similar/competing technologies	Market price; comparison with known cases	Mature technologies	Suitable comparisons can be hard to find and the data difficult to access

Table **3 –** Selection of the some of the different methods for valuing IP

Source: Fröhling, *Practical experiences regarding the evaluation of medium-sized patent portfolios*

O. ALTERNATIVES TO THE PATENT SYSTEM

	DEFINITION	CHARACTERIZED BY	USES	DIFFUSION OF TECH	ECONOMIC PROFIT
Open Source	Collective process on the production of knowledge based on free distribution	Relies on copyright to enforce license conditions set by creators	Basically software	+	-
License of rights/ Compulsory licenses	Replacement of the monopoly conferred by patents (exclusion) with right of remuneration. Base for *patent pools*	Protects technological innovation while allowing natural development of technology. No hold-up situations.	Possible on high-complexity markets	+	-
Open innovation (push/pull systems)	Systems for incentive of innovation and R&D, based on 'smart specialization'	Supply/Push measures: Industry and governments support certain directions on R&D. Demand/Pull measures: market demands certain products.	Pharma research in general, and orphan drugs in particular	+	-
Secrecy	Know-how and information of technical type, deliberately maintained confidential	Can be fragmentary protected by legal means	Almost in every field of industry, to different extents	-	-
Patronage and prizes	Direct incentives for innovation	Pre- (patronage) and post-incentives (prizes)	Any field. I.e., new technology at reasonable prices for developing countries	Only for supplementary use	

Table **4 –** Outline of some of the alternatives to the patent system

Source: Compilation from various sources

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COLOPHON

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